

Coal Age

MARCH, 1955

A McGRAW-HILL PUBLICATION—PRICE 50c

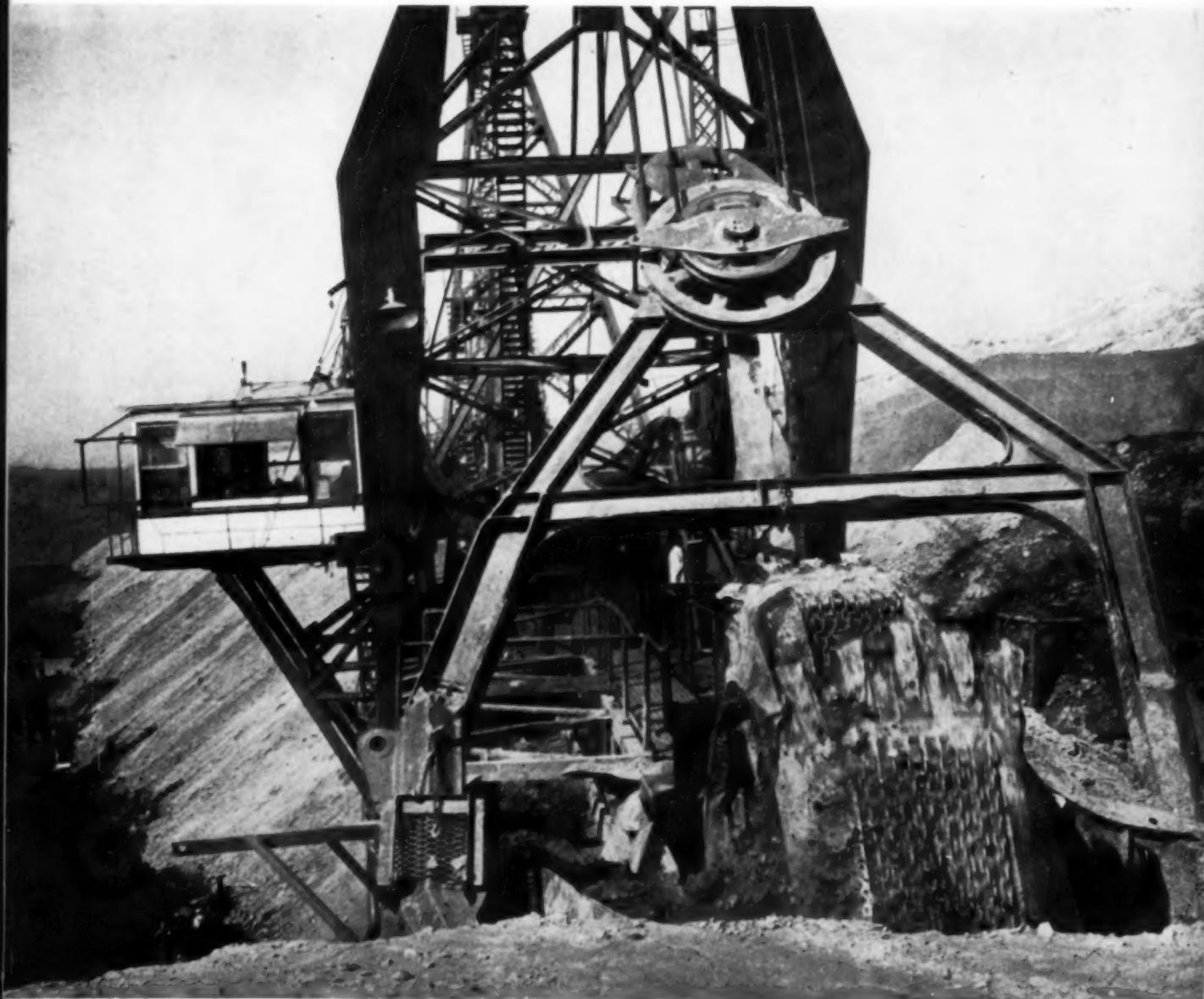
Coal for Gas

How coal may step in as a major source of substitutes when demand for natural gas outruns capacity. p 54

Automatic Loading

Here's an automatic setup for underground trip loading that paid for itself several times over. p 66

Full Contents on p 5



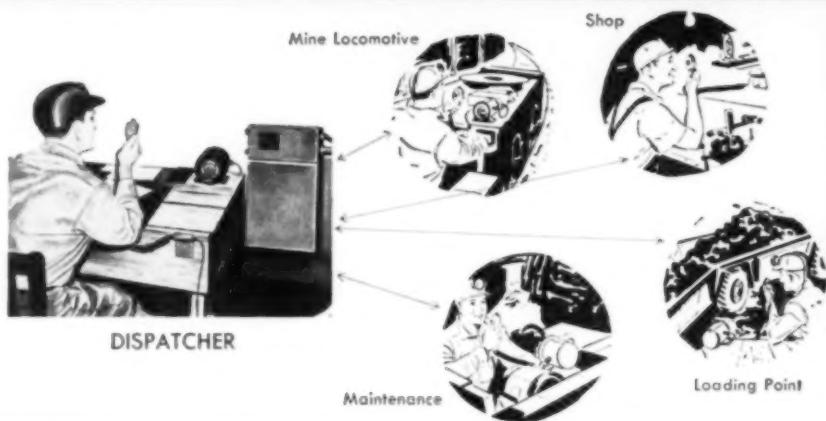
Patents Applied For

Developing the Wheel for American Stripping . . . p 58

Increase Your Production and Mine Safety with these M·S·A Communication Systems

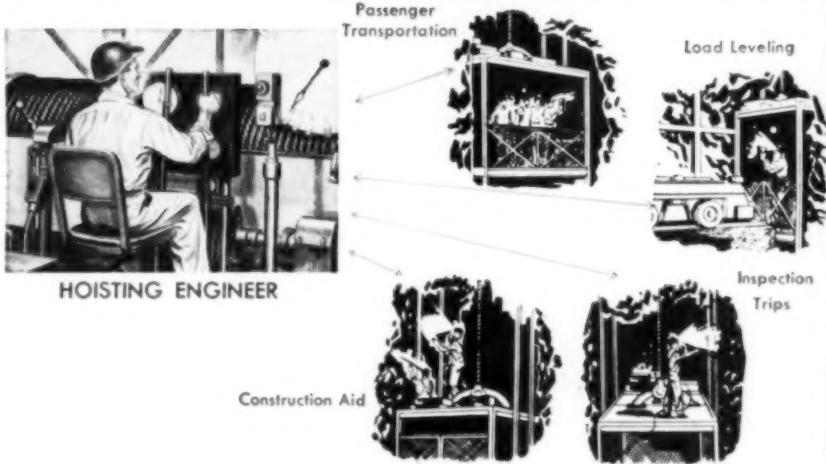
MinePhone

The M.S.A. MinePhone is eliminating communication delays in many modern mines everywhere. This clear, instant two-way voice communication system coordinates the wide variety of operations vital to peak production. Haulage moves faster because dispatcher and motormen are constantly in touch, even while trips are in motion. Shop and maintenance personnel are always "on call" to keep mining equipment in operation. Because messages are relayed instantly, on an open-line hook up, the MinePhone brings an added measure of safety to all operations. Write for details.



HoistPhone

The M.S.A. HoistPhone provides continuous, dependable and efficient voice communication between hoisting engineer and cage, at any level, and when in motion. The system is invaluable in emergencies, yet designed for day-in-day-out service. Ideal for passenger travel, load leveling, inspection trips, and construction work, the HoistPhone requires no special training; utilizes existing wiring. Write for complete details.



When you have a safety problem, M.S.A. is at your service.
Our job is to help you.

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RESEARCH KEEPS

B.F. Goodrich

FIRST IN RUBBER



That B. F. Goodrich cord belt needed no maintenance in 8 years

THAT belt, climbing 960 feet up a 14-degree incline, carries run-of-mine coal from mine to cleaning plant. A B. F. Goodrich *cord* belt was selected for this job because engineers knew no ordinary belt could handle the heavy loads over such a long incline.

Unlike the usual conveyor belt made of rubber and layers of fabric, the B. F. Goodrich belt is made with separate cords, each surrounded by rubber, running the length of the belt. When heavy loads hit this belt it "gives"—absorbs the shock instead of fighting it. The cords make the belt stronger, too, without making it stiff, so it can haul

up steep inclines and still keep its U-shape to prevent spilling.

Operating personnel like the belt for it requires no training. What's more, it has needed no maintenance whatsoever in 8 years. This lowers their cost per ton of coal. They expect the belt to last for at least six more years, reducing the cost even more.

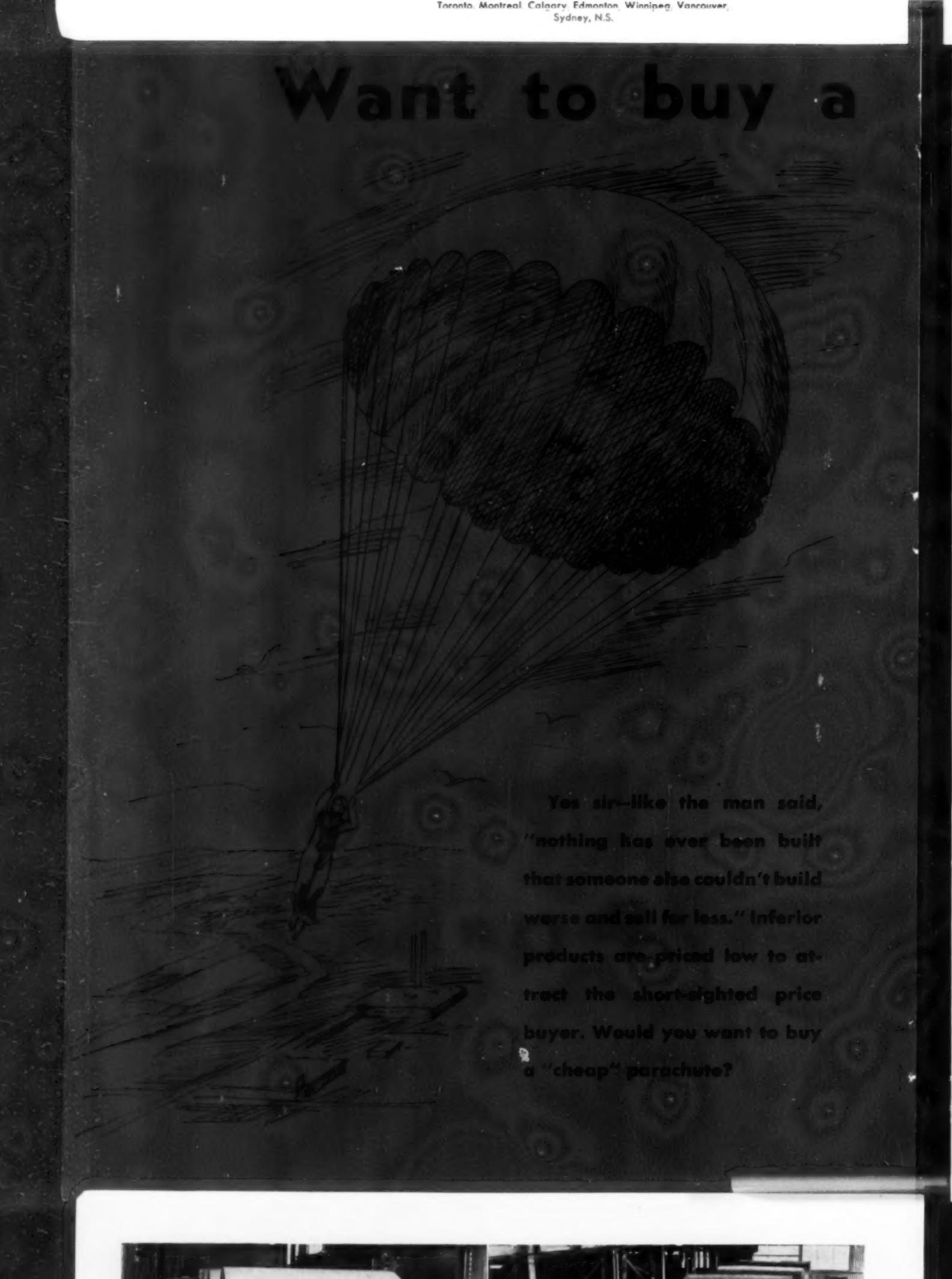
The ability to haul heavy loads long distances up steep inclines is just one of the many reasons B. F. Goodrich cord belts last longer, cut coal-handling costs. Other important construction features include high impact resistance, double protection against

mildew and natural troughing.

Also available are belts made of fire-resistant rubber. Rubber will not burn by itself. No matter what type or size of coal you have to move, there's a B. F. Goodrich Caricoal belt that can do it better, for less. Let your BFG distributor give you full details. Or write *The B. F. Goodrich Company, Dept. M-391, Akron 18, Ohio.*

B.F. Goodrich
INDUSTRIAL PRODUCTS
DIVISION

Want to buy a



Yes sir—like the man said,
"nothing has ever been built
that someone else couldn't build
worse and sell for less." Inferior
products are priced low to at-
tract the short-sighted price
buyer. Would you want to buy
a "cheap" parachute?

cheap PARACHUTE?

NO SIR, NOR INFERIOR LUBRICANTS, EITHER!

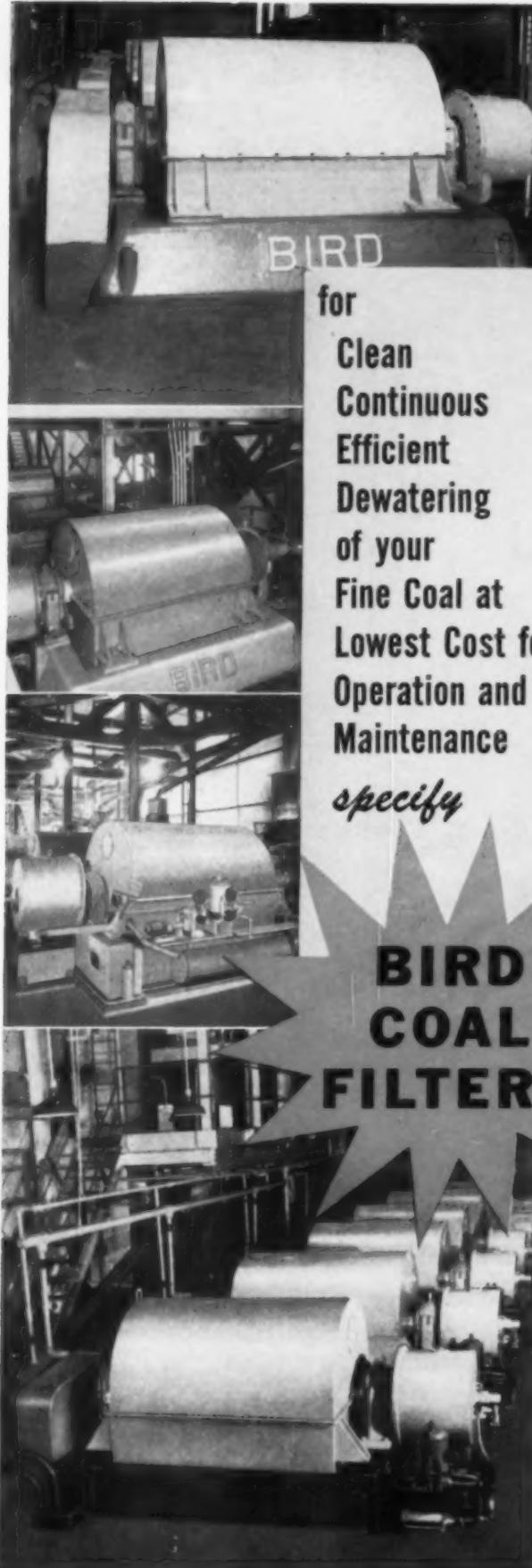


Hulburt QUALITY LUBRICANTS

Price wouldn't be your prime consideration if you had to buy a parachute to which you trusted your life. Well, you trust the life and operating efficiency of mining machines, worth hundreds of thousands of dollars, to

the protection of the lubricants you buy. Remember, every penny you spend for Hulburt gets you TOP QUALITY lubrication resulting in the lowest maintenance cost per ton. Need we say more?

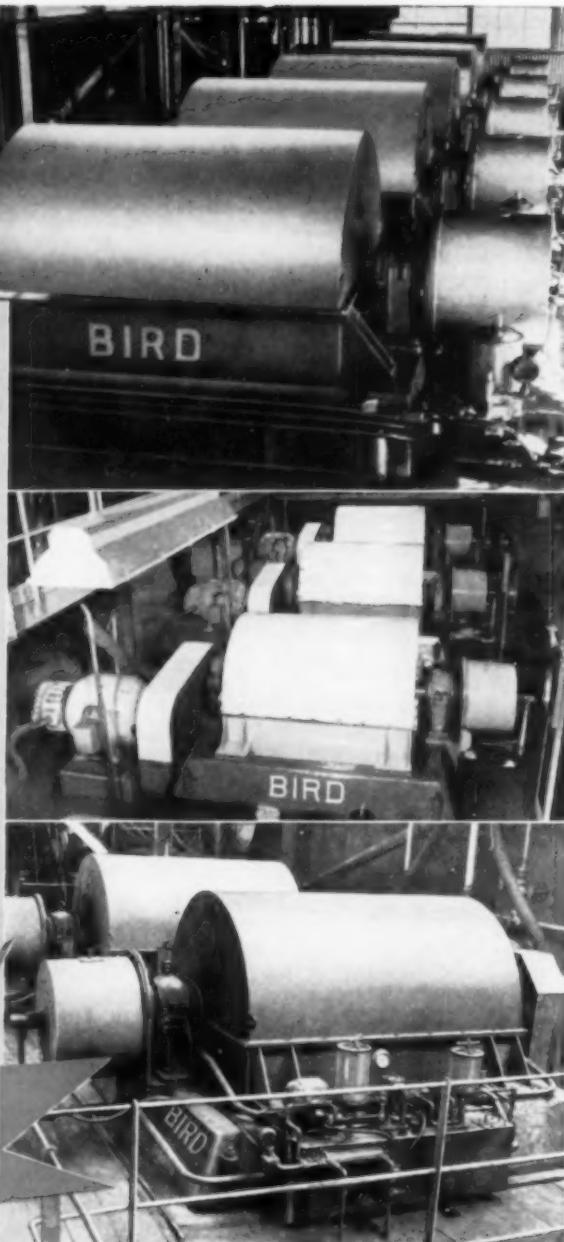
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Specialists in Coal Mine Lubrication
PHILADELPHIA, PA.



BIRD
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Continuous
Efficient
Dewatering
of your
Fine Coal at
Lowest Cost for
Operation and
Maintenance

specify

**BIRD
COAL
FILTERS**



- ton-a-minute capacity
- moisture content of $\frac{3}{8}$ " x 0 coal down to 7% or less even when there are up to 10% minus 200 mesh fines
- non-stop operation with maintenance shutdowns months apart
- operating cost around five cents a ton; maintenance averaging less than two cents a ton

Let us make recommendations and estimates

BIRD MACHINE COMPANY
South Walpole, Massachusetts

**Ahead in Coal Age**

COAL AGE "OPERATING REPORTS" scheduled for the April issue or soon after cover quite a range of new mining properties and newsworthy ideas in the effective use of machines and mining methods. Here are some you might keep your eye out for:

How an expanded roof-bolting program at an eastern Ohio mining company doubled section output, reduced direct mining cost by about 20¢ a ton and greatly improved the properties' safety record.

Efficient three-product stripping at an Indiana mine, which uses a 12-yd dragline specially serviced for steady operation to profitably recover high-quality domestic coal, terra-cotta clay and lime shales.

The most modern fine-coal recovery facilities highlight the new plant of a Pennsylvania utility built to reclaim some 570,000 tons of anthracite annually from deposits in the Susquehanna River.

How to Get More Life From Wire Rope—What you should know about wire rope, how it can be abused and practical suggestions for extending the service life of the wire ropes used at your property.

A reclamation and conservation program that restores land to as good or better condition than before stripping is a feature of the efficient stripping operations of this well-known Pennsylvania mining organization. Its program, which includes opening of a community park and an employee-recreational area in addition to restoring the land and planting trees, has received state- and nationwide publicity.

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VOLUME 60 NUMBER 3

(with which are combined The Colliery Engineer and Mines and Minerals)

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Use *Texaco Crater* on open gears, too. It clings to the teeth, won't ball up or throw off, cushions shocks and heavy loads. On both wire rope and open gears, you may prefer the convenience of liquid application. If so, use *Texaco Crater X Fluid*—it goes on quickly and easily without heating, and stays on just like the regular *Crater*.

Lubricate mine car wheels with *Texaco Olympian Grease*. Winter as well as summer, it assures easy starts . . . full protection for bearings . . . less upkeep expense.

A Texaco Lubrication Engineer can help you lubricate effectively all your mine equipment. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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TEXACO





LUBRICANTS for the Coal Mining Industry

BIG REASONS WHY ALLIS-CHALMERS

5

move more dirt at

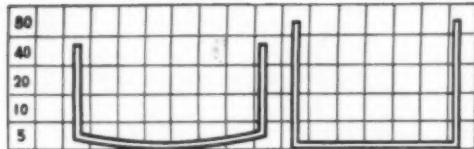
Watch an Allis-Chalmers scraper at work and you'll see that it loads bigger — travels and maneuvers more easily — puts more dirt right where you want it with the least tractor effort. Check features and you'll understand why an Allis-Chalmers scraper is able to outperform others. Then compare prices and you'll see that it gives you more scraper capacity per dollar — more for your money in every way.



*I*NTRODUCING THE AC-108, newest scraper in the Allis-Chalmers line — shown here with an Allis-Chalmers HD-15 Tractor. Has 8.4 struck capacity (11 yd heaped). Incorporates all of the big-yardage features that have been job-proved in the other Allis-Chalmers scrapers, 2 to 18 yds heaped capacities.

SCRAPERS

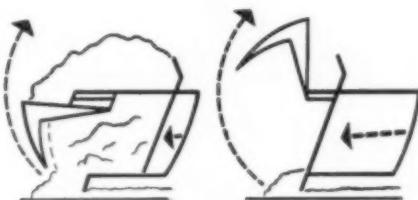
lower cost



2

LESS LOADING RESISTANCE

Low, wide bowl plays an important part in ease of loading. Since loading resistance is largely determined by the height to which the load is built, the lower, wider bowl of an Allis-Chalmers scraper requires less time and power to get the same yardage as other scrapers.



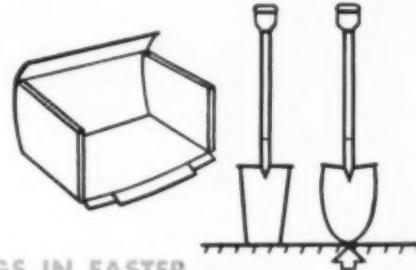
4

POSITIVE EJECTION ASSURES EVEN SPREADING

With patented linkage, apron lifts, then moves forward and up as ejector pushes forward. High apron lift prevents any possibility of material's jamming. Even when loaded from overhead, anything that can be put into the bowl can be easily ejected. Ejector returns to loading position automatically by spring action and apron weight.

• • •

There is an Allis-Chalmers pull-type scraper for every tractor . . . every job. Write for literature or contact your Allis-Chalmers dealer.



1

DIGS IN FASTER

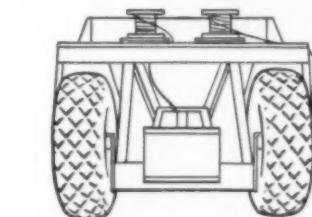
Curved and offset cutting edge on Allis-Chalmers scrapers concentrate all the tractor horsepower on the center section during initial penetration. The penetrating ability of a round-end spade helps illustrate the soundness of this Allis-Chalmers design.

Diagrams show how an automatically heaped load avoids costly spillage even though the center is built up above the sides of the bowl.

3

HEAPS AUTOMATICALLY

The combination of slightly deeper center cut and correctly angled cutting edge shapes the load as the scraper fills. The greater volume of dirt flowing into the center of the curved bowl "boils" forward, to the rear and to the sides, pulverizing the dirt, filling the voids and producing an automatically heaped load without excessive spillage.



5

HAULS, MANEUVERS EASILY

Big, low-pressure tires provide maximum flotation. The extra wide, low bowl keeps center of gravity low, helps the scraper hug the ground for safety. Front running gear has ample clearance at all points, high carrying position clears uneven ground.

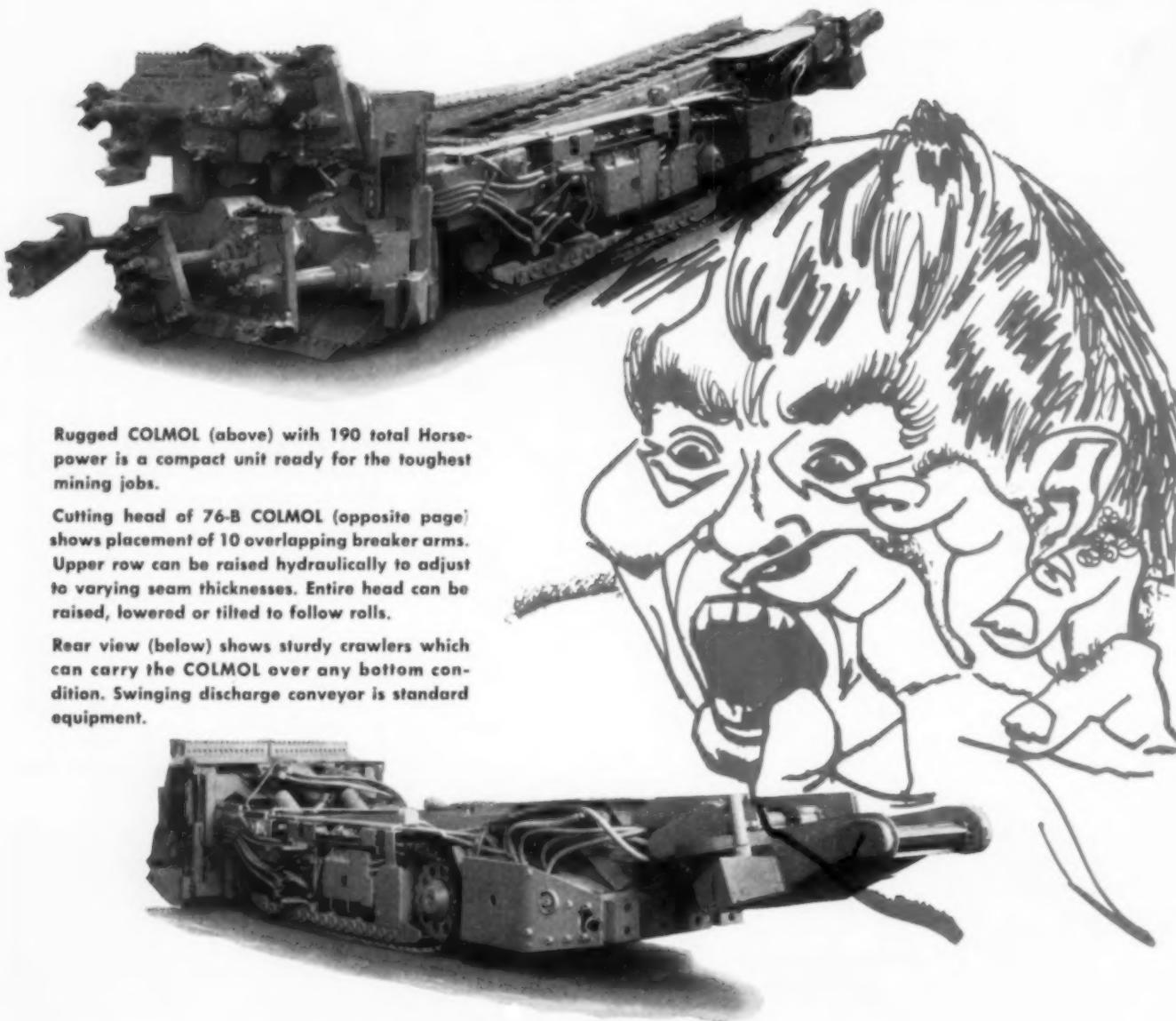
Scrapers main frame is shorter because exclusive linkage moves apron forward as well as upward to clear main frame at full height. The two-to-three feet shorter wheel base permits easier maneuvering. Scraper can turn in its own length.

ALLIS-CHALMERS
TRACTOR DIVISION · MILWAUKEE 1, U. S. A.

HUNGRY GIANT... BIG APPETITE!

JEFFREY
76-B COLMOL
(PATENTED)

for continuous mining...
up to 80 tons per man-shift
in medium-high seams



Rugged COLMOL (above) with 190 total Horse-power is a compact unit ready for the toughest mining jobs.

Cutting head of 76-B COLMOL (opposite page) shows placement of 10 overlapping breaker arms. Upper row can be raised hydraulically to adjust to varying seam thicknesses. Entire head can be raised, lowered or tilted to follow rolls.

Rear view (below) shows sturdy crawlers which can carry the COLMOL over any bottom condition. Swinging discharge conveyor is standard equipment.



High Tonnage! That's the COLMOL feature you'll like best. Other continuous-type mining machines can't match tonnage records chalked up by the 76-B COLMOL working in medium-high coal.

Production up to 80 tons per man-shift is common. A COLMOL working a W. Va. seam with a crew of 7 recently produced 900 tons of coal in a single shift . . . a figure which challenges comparison!

This 35-ton giant advances continuously into a solid seam. It mines all coal to a width of about 10' and from 46½" to 72" high, according to which of three 76-B models is chosen.

Moving forward on long wide crawlers, the COLMOL's slowly revolving arms (60 RPM) break coal from the face. Coal is swept downward and inward to the conveyor, carried back over the machine and onto a discharge conveyor with a 31 degree

swing to either side. Discharge conveyor flexibility makes shuttle car loading easy.

The operator supervises the controls from a protected position 20' from the face. He likes the COLMOL because the controls, once set, need little attention . . . no tiresome jiggling back and forth. Also, the COLMOL can turn in its own length and operates with little noise, vibration or dust.

High productive capacity with the 76-B COLMOL means lower mining cost per ton for you. Not only that, but screen analyses of coal mined with this Jeffrey unit demonstrate clearly that output is favorable in size composition with that produced by "conventional" mining.

If 1955 is the year your mine joins the swing to continuous-type mining, get the Jeffrey COLMOL story first . . . the story that begins with *high tonnage* at the face and ends with *low cost per ton* at shipment.



THE JEFFREY

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TO DO YOUR MINE HAULAGE JOB FOR
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To help you get
profitable tonnage
in low coal



21184

Goodman Type 865 Loader ▲
Tramming height - 26½"



21179

Goodman Type 870 Shuttle Car ▲
Basic height - 26"

Count on Goodman
low height loaders
and shuttle cars

Goodman low height loaders and shuttle cars are fast working, have all the strength generally found only in big equipment for high coal, and almost as great a working capacity. In free coal the loader is rated at 8 tons per minute. The capacity of the shuttle car — water level full — is 94 cubic feet.

A Goodman sales engineer can give you complete details.

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with cost-cutting ruggedness

This new INTERNATIONAL 60,000-pound GVW 6-wheeler has what it takes for rugged strip mining and other coal field work. It's built to absorb severe loading shocks — with ability to transport heavy equipment over-the-road at maximum safe speeds.

In this model RF-230 you'll find the all-new INTERNATIONAL 212-hp. Royal Red Diamond 501 engine which delivers 444 lb-ft torque at 1600 rpm. And there are other features of extra value including hydraulic full-power steering, 12-volt electrical system. Engine and all components are exactly matched to assure maximum operating economy, minimum maintenance and long life.

This newest INTERNATIONAL is Tough-Job engineered like all INTERNATIONALS — has all the performance, strength and stamina qualities that have made INTERNATIONAL the 6-wheel sales leader for 20 straight years. One of ninety-two 6-wheel models for every 6-wheel job. Get full facts from your INTERNATIONAL Dealer or Branch.

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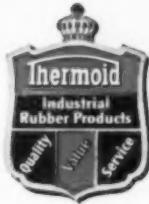
See the season's new TV hit, "The Halls of Ivy," with Ronald Colman and Benita Hume, CBS-TV, Tuesdays, 8:30 p.m., EST

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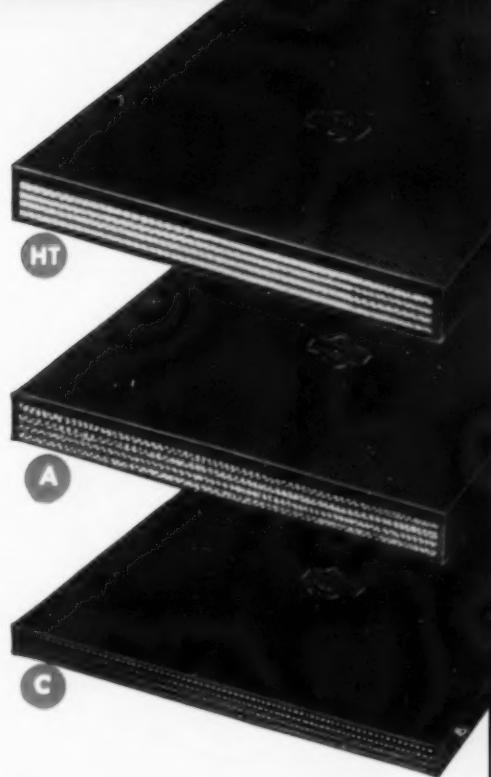
Thermoid
Conveyor Belting
cuts handling costs
on rugged mining jobs



There's a Thermoid Conveyor Belt designed to lower your handling costs on every mining job. Here are three examples:

HT —For extremely abrasive materials such as coal, granite, trap rock, flint rock, quartz ore; **A** —For slag, lime rock, crushed stone and other highly abrasive materials; **C** —For moderate abrasives such as sand, loam, soda, gravel.

Thermoid's exclusive impregnation process welds carcass and cover into an exceptionally strong, durable belt. Finest quality reinforcement and specially compounded rubber stocks assure long life . . . lower your handling costs per ton. Your Thermoid Distributor carries a complete line of Thermoid Conveyor Belting, Multi-V Belts and Hose to meet the most severe requirements of any mining operation. Call him or write direct for full information.

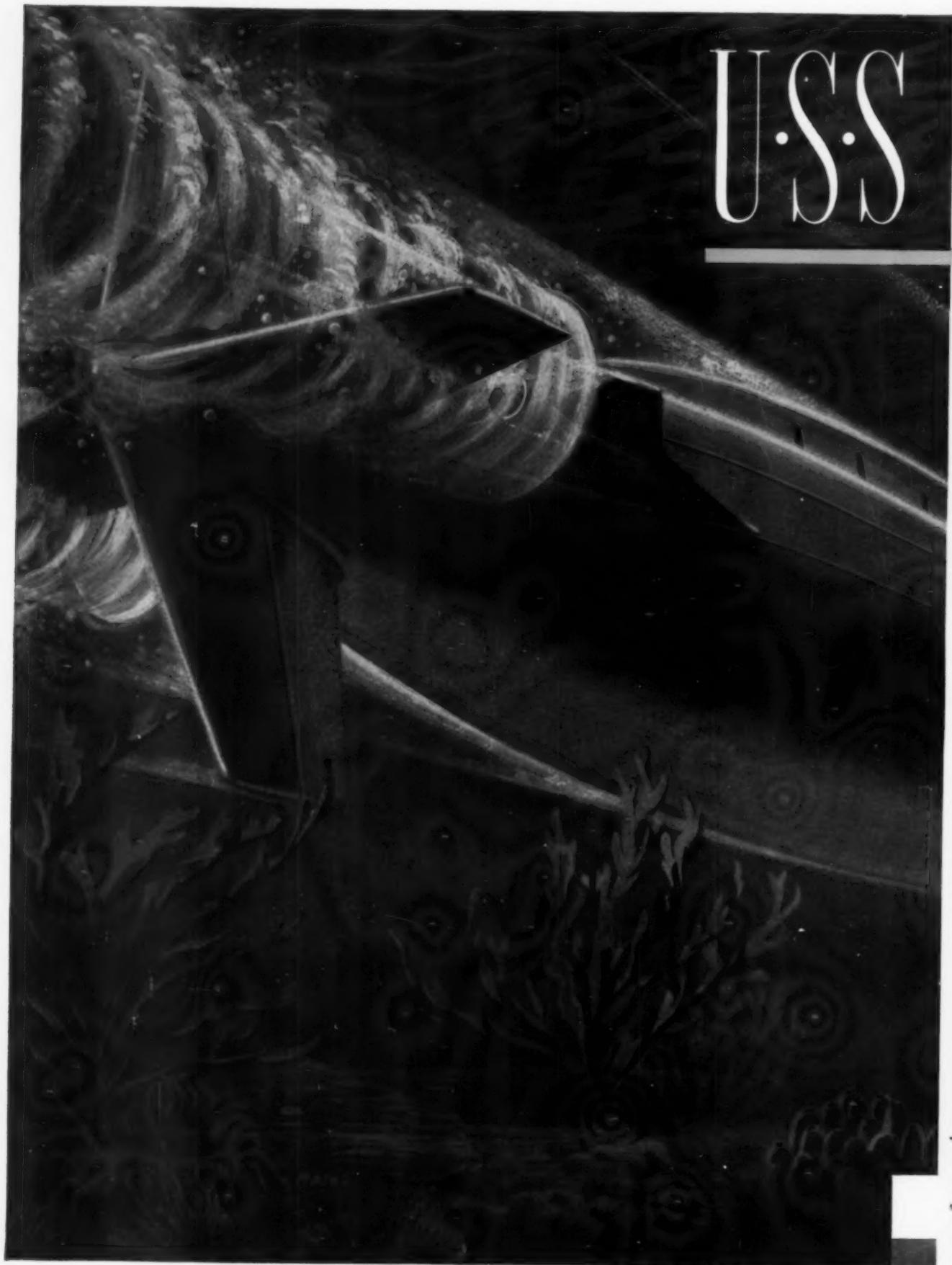


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U.S.S.



Nautilus



*first
atomic submarine
uses*

TIGER BRAND ELECTRICAL CABLE

The Nautilus was built by General Dynamic Corporation's Electric Boat Division shipyard, at Groton, Conn. She was launched on January 21, 1954.

Very frankly, we cannot recall a more *critical* application of electrical cable than this new atomic-powered submarine. And from one end to the other, this amazing boat is laced with Tiger Brand Electrical Cable.

But here's the important thing—*you* can get the same quality that went into the Nautilus. Just call your American Steel & Wire salesman.

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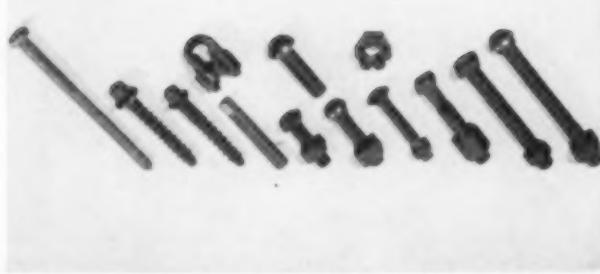
USS Tiger Brand

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WIRE & CABLE

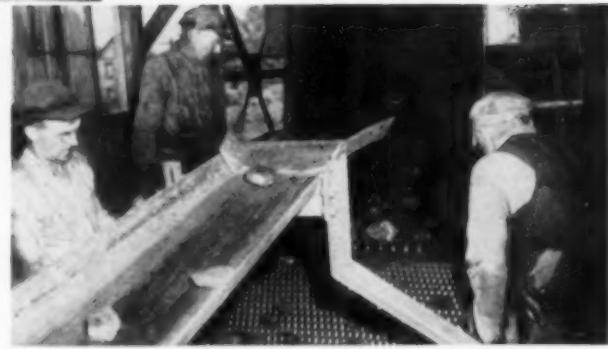


UNITED STATES STEEL

Are hungry mine waters



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eating you out of Pipelines?

REPUBLIC FLEXIBLE PLASTIC PIPE can solve this problem. It's corrosion resistant

If you're tired of enormous bills for replacing corroded-out drainage lines, we have a practical suggestion.

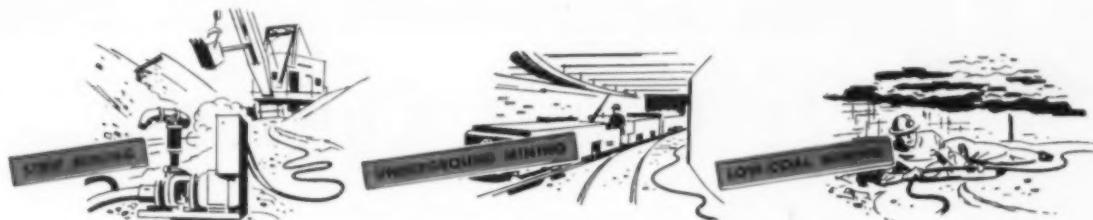
Install Republic's New Flexible Plastic Pipe throughout your surface and underground mines. Made of chemically inert polyethylene, it cannot be damaged by acids, alkalies, metallic salts, or other corrosive wastes. It's also immune to the effects of electrolytic action, will not rot from the sun's ultra-violet rays.

Easy to handle, Republic Flexible can be made up quickly by one man. Only tools needed are an ordinary knife or handsaw and a screwdriver for tightening the stainless steel clamps. Installation is 75% faster, much less expensive.

Its lightness makes Republic Flexible a pleasure to work with where space is limited. Available in long lengths, it can snake conveniently

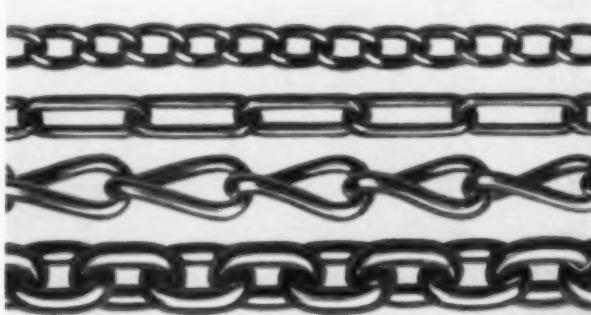
around corners. In low-coal mining, for example, one man can easily drag several hundred feet with no cumbersome joining to worry about. Its flexibility makes it ideal for strip operations where it can be moved from one location to another with ease. It follows terrain contours, can be dragged over sharp rocks with little danger of damage.

Republic Flexible Plastic Pipe is made in 9 sizes from $\frac{1}{2}$ " to 6". In coils it comes in sizes $\frac{1}{2}$ " through 3" in diameter. Straight lengths are furnished in 4" and 6". A complete line of insert-type fittings for any type of piping arrangement is also available—whether plastic to plastic, or plastic to steel. Sold by your local Republic jobber. For additional information, mail coupon.



REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products



ON MINING JOBS WHERE STRENGTH AND LONG LIFE ARE ESSENTIAL, you can count on Republic chain for greatest safety and dependability. Republic's Chain Division makes a complete line of welded and weldless chain for every mine requirement—every type of fitting, attachment and accessory. Strategic location of Republic plants and warehouses assures you of prompt delivery. Send coupon for additional information.



Republic Steel Corporation
3124 East 45th Street, Cleveland 27, Ohio

Please send me additional information on:

Plastic Pipe Stainless Steels
 Bolts and Nuts Chain

Name _____ Title _____

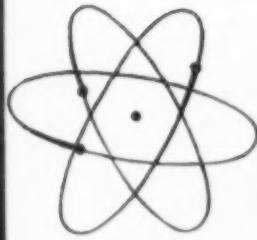
Company _____

Address _____

City _____ Zone _____ State _____

K-5056

For the world's happiest shovel owners and operators:



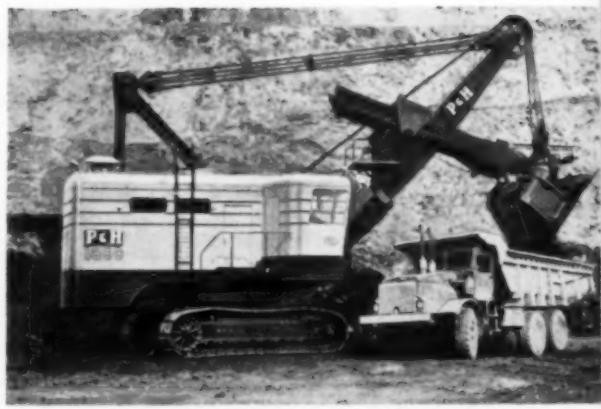
P&H

Electronic Control

Step into the new "production office" of the P&H Model Electric Shovels. Look at the control station. Can you imagine anything simpler?

What you can't imagine is the difference it makes with all operating motions electronically controlled. Response is faster, performance characteristics are improved. There's better co-ordination for the operator — and a total absence of physical effort. The new advantages made possible with complete electronic control account for up to 10% more production. And that means lower tonnage costs, of course.

P&H Electronic Control is dependable, thoroughly proved in the field. It now becomes standard on all P&H Electric Shovels — another example of the way P&H leads the field in Electric Shovel developments.

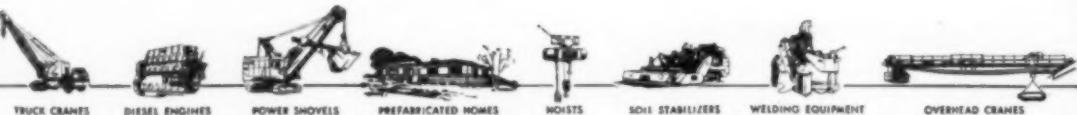


P&H Model 1800 Electric Shovel — 8 cubic yard machine

P&H ELECTRIC SHOVEL DIVISION

HARNISCHFEGER CORPORATION
MILWAUKEE 46, WISCONSIN

the **P&H** *Line*



"Marshal" M meets our specifications

How TIREFIX reduces shuttle car cable failures

Semicircular ridges, integral parts of the conductor insulation, grip the jacket tighter than conventional round conductors ever could. This greater gripping ability prevents insulated conductors from moving inside the jacket. Stopping conductor movement within the sheath stops cable failure from conductors twisting, bending and pulling.

An open braid applied over the ridges locks the insulation and jacket together. It works this way: As Selenium Neoprene Armor is extruded over the insulated conductors, it flows around the braid between the ribs. The ridges increase surface area of the insulation, thus making more area for more adhesion.

TIREFIX's Selenium Neoprene Armor resists abrasion, acids, chemicals, corrosion, flame, moisture and oils. Jacket thickness conforms to Bureau of Mines tolerances. Jacket-molded Approval No. P-101 BM assures compliance with Federal and Pennsylvania Safety Codes.

TIREFIX Shuttle Car Cable with its cured-in-lead Selenium Neoprene Armor is available either with or without grounding wires. Write to the address below, or contact the nearest Simplex representative, to learn more about how TIREFIX can help you reduce shuttle car cable failure.

SIMPLEX WIRE & CABLE COMPANY
79 Sidney Street, Cambridge 39, Massachusetts

Pioneers in Research on Wires and Cables Since 1889

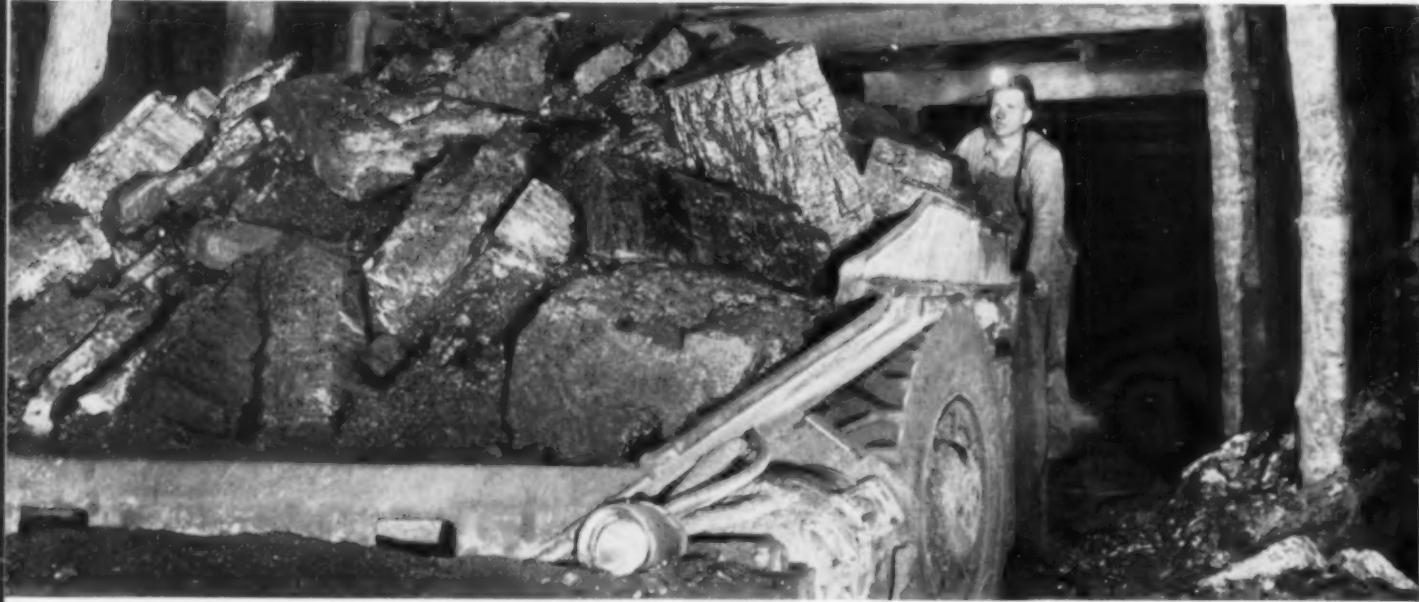
TIREFIX

"Monobel" AA meets our specifications for a permissible"

States the Management of the Clinchfield Coal Co., Dante, Va.

"Our No. 2 Moss Mine (Va.) has a heavy slate binder and many wet bottom holes, which can really make it tough for a permissible. To maintain production, we need one that (1) gives good lump, (2) breaks our binder into load-

able sizes, (3) has good water resistance, (4) squares up the face, (5) shears the ribs clean and (6) gives us good loadability. We've found "Monobel"® AA right for the job, and have used it since the mine was opened in 1947."



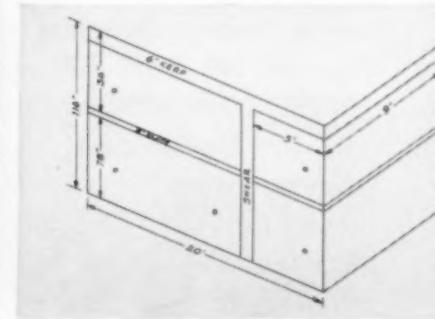
HAULING off another load of firm, coarse coal . . . the type of lump desired. Loading is fast, as Du Pont's popular permissible "Monobel" AA throws the coal out where the loader can easily handle it. And the binder running from zero to 15" thick is completely broken up, but not shattered . . . isn't mixed with the coal.



HEAVING action of "Monobel" AA consistently produces a high percentage of good lump in the No. 2 Moss Mine.



SHEARING the ribs and up the back cleanly, "Monobel" AA gives maximum recovery with no dangerous overhang.



WORKING with Du Pont technical service men, the company developed this drilling pattern for the Clintwood Seam.

A **permissible** doesn't gain acceptance by chance. It has to deliver, despite wet holes, tough rock formations. That Du Pont "Monobel" AA is the world's largest-selling permissible can mean only one thing: mine owners and operators throughout the industry must consider it best under a wide variety of conditions. Can it help you increase output, too? Test it in your mine and see. For complete details contact the Du Pont Explosives man in your district. E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Del.

DU PONT PERMISSIBLES

Blasting Supplies and Accessories



REG. U. S. PAT. OFF

BETTER THINGS FOR BETTER LIVING ... THROUGH CHEMISTRY

Here's the LOWEST COST, MOST MODERN WAY

MORE LOADS

per operating dollar!

To get the double-barreled advantage of high-output capacity and low upkeep requirements, investigate the completely new Bucyrus-Erie Model 71-B. It's an outstanding excavator, modern all the way through from crawlers to boom point sheaves for extra digging power, digging speed and digging life.

DIGGING POWER is effectively applied by front-end design that features strong, light-weight boom, twin large diameter sheaves, rectangular inside dipper handle, and positive twin-rope balanced crowd.

DIGGING SPEED is high because full air control (not just air assist) of all operating

clutches plus digging and steering brakes permits efficient application of 71-B power for faster operating cycles.

DIGGING LIFE is lengthened by Bucyrus-Erie Individual Design that matches three-yard capacity with a solid crawler mounting, heavy-duty diesel engine, and strong simple main machinery. Torque converter drive automatically balances engine output with load demands.

Full information on the 3-yd. 71-B, convertible to dragline, crane or clamshell, is yours for the asking. See your local Bucyrus-Erie distributor.

82E54C



BUCYRUS-ERIE COMPANY

South Milwaukee, Wisconsin

**Here's the LOWEST COST, MOST MODERN WAY
to carry your coal away from the face**

DRIVE ← BELT (Up to 1000 ft.) → TAIL

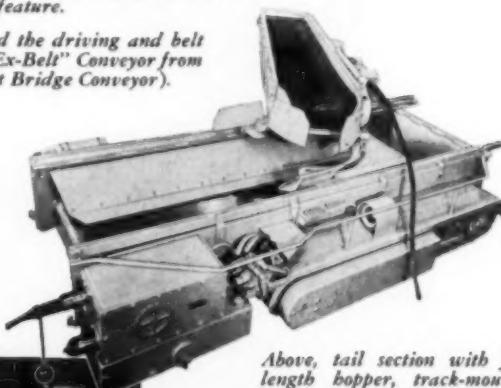


E-X-T-E-N-S-I-B-L-E FOR TRUE CONTINUOUS HAULAGE



Above, the crawler-mounted driving section. At the rear is the first stand of the Joy "LIMBEROLLER" Idler system, an exclusive feature.

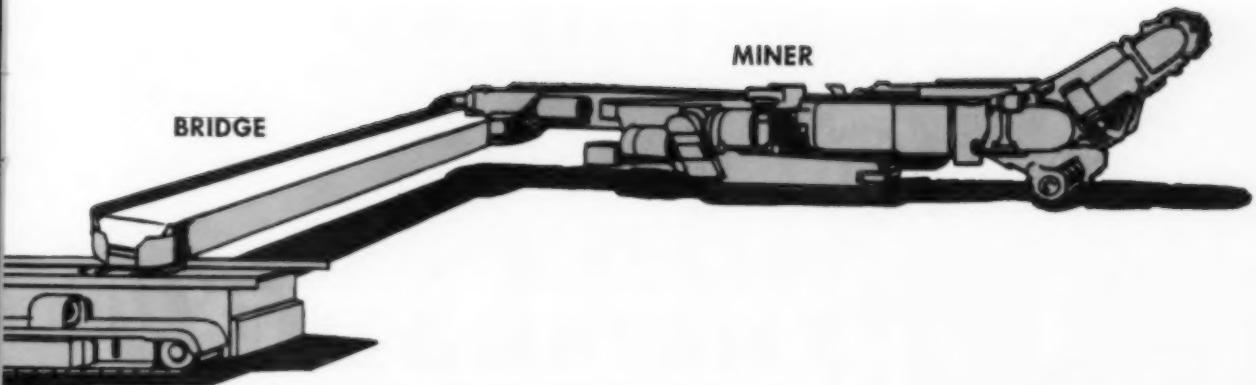
Left, looking up toward the driving and belt storage section of the "Ex-Belt" Conveyor from the tail section (without Bridge Conveyor).



Above, tail section with full-length hopper, track-mounted sliding carriage, and Bridge Conveyor which provides a flexible connecting link from a Continuous Miner (see drawing at top of page).



As the Continuous Miner advances while mining a room of 16-foot width, a continuous stream of coal moves away from the tail section and up the "Ex-Belt" Conveyor toward the camera. Note the perfect troughing of the belt and the smooth, steady action of the LIMBEROLLER idlers, rotating with practically no waver. Along the rib, note how the required idler stands and side rails for a 15' section of the belt stack compactly between timbers.



BELT CONVEYOR

FROM CONTINUOUS MINING MACHINES

EXTENDS OR RETRACTS 50 FT. AT A TIME UNDER FULL LOAD

With the Joy "Ex-Belt" Conveyor, once again we have broken into new ground in our continuing development of the science of mechanized mining. Once again a Joy field-proved unit gives you a real opportunity to make another important reduction in your production cost-per-ton . . . the saving you need to maintain or increase your profit margin today.

The Extensible Belt Conveyor now, *for the first time*, gives you a continuous haulage system for Continuous Miners in driving rooms and entries up as far as 1,000 feet, including breakthroughs and taking pillar on retreat. Available in 24", 30" or 36" widths, it consists of two main units: a driving section and a tail section, both of which are self-propelled on identical crawler treads. It extends or retracts 50 feet while operating under full load, and belt tension and slippage are under automatic control at all times. A 100-foot length of belt can be added or removed, as needed, in an average time of only 5.3 minutes; and the entire system can be moved over and set up for a new heading in less than 2 hours.

Perhaps most important of all, the Extensible Belt Conveyor follows the Joy tradition of simply-

designed, rugged, foolproof equipment that can take the heaviest duty underground and stay on the job month in and month out. That is your final assurance of securing the favorable cost basis and production rates for which the Joy "Ex-Belt" was developed. **Joy Manufacturing Company, Oliver Bldg., Pittsburgh 22, Pa.** In Canada: **Joy Manufacturing Company (Canada) Limited, Galt, Ont.**

WRITE FOR BULLETIN J-303

TYPICAL FIELD PERFORMANCE

In an Eastern Ohio mine, operating in 54"-60" coal (Ohio #8 seam), a Joy Continuous Miner and Extensible Belt Conveyor team permitted the driving of rooms 16 ft. wide to a depth of 600 ft. Average production rate for panels of seven rooms varied from 302.3 to 325.4 tons per shift. Average time required to change over equipment was 1½ hours (from shut-down in one room to start-up in the next).

Consult a Joy Engineer

For a complete line of Belt Conveyor equipment available in all necessary belt widths, and various types of idlers and stands to meet any gathering or main haulage requirement.



W&O CL5362B

JOY

WORLD'S LARGEST MANUFACTURER OF
UNDERGROUND MINING EQUIPMENT

Since 1856

HUMBOLDT

Mines Equipment, Mineral Dressing
Plants, Crushing and Grinding Ma-
chinery, Cement Mill Outfit, Metal-
lurgical Works, Coal Preparation
Plants, Steel Constructions for Build-
ings and Bridges.

Since 1864

DEUTZ

Otto, Gas, Diesel-Engines for Every
Purpose of Two-and Four-Stroke De-
sign, Output Range 3-2000 H. P.
Cooled by Water or Air, Diesel-pow-
ered Tractors, Diesel Locomotives,
Gas Producer Plants.

Since 1864

MAGIRUS

Trucks and Busses driven by air-cool-
ed DEUTZ Diesel Engines, Vehicles
for Municipal Services, Fire Ladders,
Fire Engines, Fire-Fighting Water
Trucks, Two-wheeled Ladders, Fire-
Fighting Equipment.

KLÖCKNER-HUMBOLDT-DEUTZ AG · KÖLN

Send inquiries to either Köln, Germany or Ulm, Germany

Address inquiries from U.S.A., Alaska, Hawaii and Puerto Rico to: DIESEL ENERGY CORPORATION, 143 Liberty Street, New York
6, N.Y. Certain territories open for distributors.

ANOTHER

FAIRMONT PREPARATION PLANT



Fairmont-built plant processing 210 TPH of 7" x $\frac{1}{8}$ " No. 4 Pocahontas coal for the Gulf Smokeless Coal Co. at Tams, W. Va.

*Something
Extra*

...for tough cleaning jobs

Where a high reject rate and percentage of near gravity material presents a cleaning problem, the competitive market demands an efficient cleaning process.

Fairmont-built Preparation Plants meet those market demands through coordinated responsibility in design, engineering, fabrication and erection . . . coordinated responsibility which results in specifying the proper equipment to do the job and "some-

thing extra" toward greater operating economy and production efficiency.

When you have a cleaning problem, let Fairmont assume the full responsibility of providing or modernizing a plant that guarantees product uniformity and over 99% separating efficiency through a wide size range in any tonnage capacity. Call a Fairmont Engineer.

FAIRMONT MACHINERY COMPANY

FAIRMONT, WEST VIRGINIA

DESIGNERS AND CONSTRUCTORS OF COMPLETE COAL PREPARATION PLANTS USING BOTH WET
AND DRY CLEANING, CENTRIFUGAL AND THERMAL DRYING.

an
ACCO
product

After years of field testing . . .

AMERICAN CHAIN & CABLE

Announces with Pride

TRU-LAY VHS

Very High Strength Wire Rope

TRU-LAY VHS will soon be the talk of men everywhere who use wire rope on the toughest jobs, as scraper ropes, drag lines, shovel hoist ropes, logging chokers, rotary drilling lines and slusher ropes.

TRU-LAY VHS has 15% greater tensile strength than rope made of IPS—Improved Plow Steel. Up to now IPS has been the top standard rope.

STRONGER AND TOUGHER

On jobs where the strength of wire is the big thing, VHS wins hands down.

It's so much stronger that you can safely handle heavier loads with the same diameter rope; or you can use smaller ropes for the same loads.

Along with its greater strength, VHS is a tougher and more wear-resistant rope. It offers greater resistance to abrasion. This means size for size, VHS rope will last longer.

Stronger and tougher, this new rope reduces replacement time. It increases work output and cuts down the number of feet of rope needed to operate your equipment.

A NEW GRADE OF STEEL

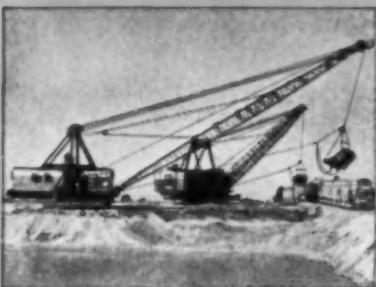
The secret of TRU-LAY VHS rope is a new grade of steel for wire rope and a certain way of processing it. ACCO engineers and researchers have worked on this for years. Now we are confident that it is the greatest improvement in wire rope since we announced Preformed thirty years ago. Those who have used it say it is by far the best rope they've ever used...In short, it combines all the advantages of Preformed with the added strength and toughness of VHS.

Developed for These TOUGH JOBS



SCRAPER ROPES

Small sheaves and drum, cross winding, dirt—all call for VHS with its higher strength, flexibility and resistance to abrasion.



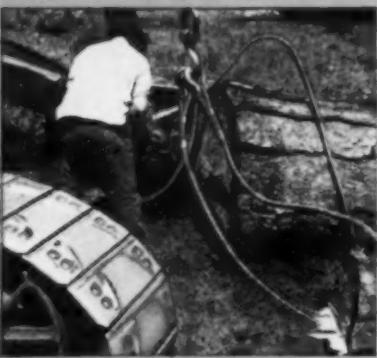
DRAG LINES

Are whipped, jerked, scraped, and dragged in the dirt. But a TRU-LAY VHS drag line will carry on long after other wire ropes are torn to shreds.



SHOVEL HOIST ROPES

Continuous bending and shock loads necessitate VHS, with its high resistance to abrasion and greater strength.



LOGGING CHOKERS

Here VHS's greater strength in a small rope size means easier handling for the setter. Combined with ACCO's DUALOC endings this means the ultimate in choker ropes.



ROTARY DRILLING LINES

Stronger VHS provides additional weight lifting capacity for deeper drilling with the same size rope. And it takes rough handling and abrasion in stride.



SLUSHER ROPES

Are dragged in the dirt and crosswound on small sheaves. Service records show that TRU-LAY VHS lasts longer in this tough service—costs much less to use.

VHS is the Biggest Thing in Wire Rope Since Preformed

TRU-LAY VHS was applied to certain confidential military uses during World War II. Until very recently, military applications have consumed almost all of our available output.

However, since the war a limited quantity has been sold under close control for specific commercial uses.

It was tested under the most severe service conditions and it wasn't babied. *The tests proved that it lasted longer and did more work with less downtime for replacement.*

These on-the-job tests proved that TRU-LAY VHS reduced service costs below that of Improved Plow Steel

wire rope which, up to now, has been the highest standard grade of the wire rope industry.

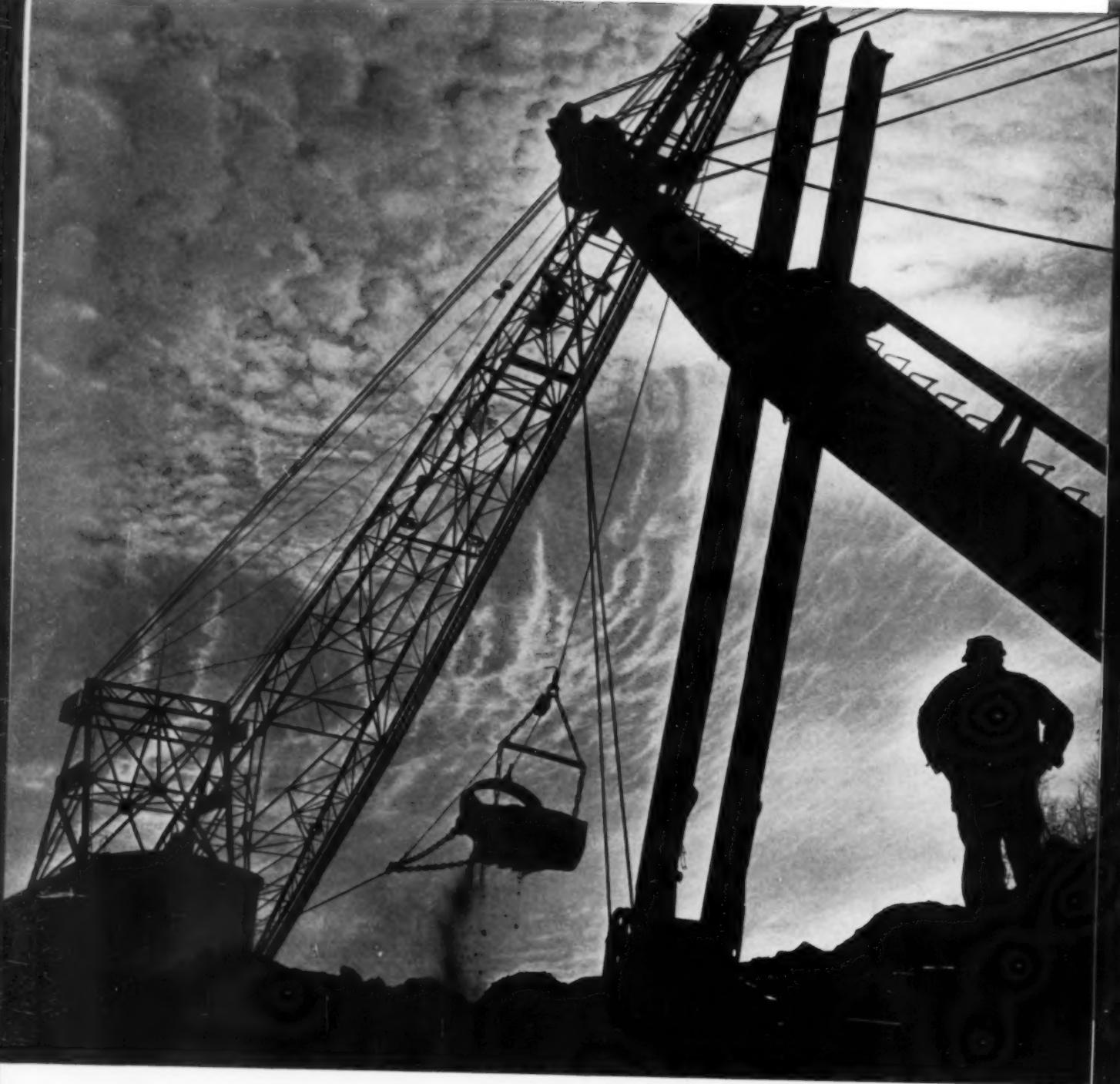
Now you can get this new and better grade of Preformed wire rope—TRU-LAY VHS—for use on the types of machines illustrated above.



American Cable Division
AMERICAN CHAIN & CABLE

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston,
Los Angeles, New York, Odessa, Tex., Philadelphia,
Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.





Wire Rope at Work—At DeBardeleben Coal Corporation, Empire, Ala., tough stripping jobs like this one are part of the daily program. Thirty-seven feet of overburden is here being removed from the coal seam, and it is rough going, due in part to the large sandrock formations.

The dragline excavator is rigged with a 10½-yd bucket; the shovel with a 2-yd bucket. To help combat the very mean conditions, both machines use Bethlehem wire rope, Purple Strand grade, for hoist and boom lines. The big dragline, a 2½-in. rope, is also Purple Strand. In a service that is unusually severe, these Bethlehem ropes have shown the stubborn toughness and strength that are always the mark of top performers.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:
MINING • CONSTRUCTION • PETROLEUM • EXCAVATING • QUARRYING • LOGGING • MANUFACTURING





...Always Buy TIMKEN from Bearings, Inc.

Authorized Distributor Since 1927

No need to substitute—we, as authorized distributors, have complete stocks on all types and sizes. Our Timken bearings are from current production and embody the latest technological improvements and refinements in Timken design.

We know Timken—we know the best Timken for every application . . . we know that Timken cones operate successfully *only* with Timken cups and we can quickly show you why!

Call Bearings, Inc. . . . we'll save you time, trouble and money by having the bearing you need available immediately!

Did You Know—on Timken double row type bearings there are three different tolerances all carrying the same size number? For example: In steel mills a flying shear requires bearings of less clearance than standard. A table roll, because of the extreme heat, requires a bearing with greater clearance than standard, while a crane operates best with a standard clearance bearing.

Bearings, Inc.

WEST VIRGINIA: Charleston
PENNSYLVANIA: Erie • Johnstown • Philadelphia • Pittsburgh • York
OHIO: Akron • Canton • Cincinnati • Cleveland • Columbus • Dayton • Elyria
• Hamilton • Lima • Mansfield • Toledo • Youngstown • Zanesville
INDIANA: Ft. Wayne • Indianapolis • Muncie • Terre Haute
NEW JERSEY: Camden
Subsidiary: Kentucky Ball and Roller Bearing Co. • Louisville, Ky.

Bearings, Inc., 3634 Euclid Avenue, Cleveland 15, Ohio

Gentlemen:

I would like complete information on Timken Bearings, as advertised in COAL AGE.

Name _____

Firm _____

Address _____

City _____ Zone _____ State _____



7 important Dumptor advantages

Take another look at the latest model Koehring 6-yard Dumptor shown here. It has some important features worth checking. Notice how heavy snubber-spring on steering axle cushions road shocks — yet retains Dumptor's unique advantage of no spring maintenance. There are no leaf springs. Big shock-absorbing drive tires eliminate need for springs on the drive axle.

Alignment of drive wheels with steering wheels adds to efficiency of Dumptor no-turn shuttle hauling — makes a big difference in traction and flotation when Dumptor is shuttling back and forth across loose stockpiles, soft ground.

Another basic Dumptor advantage is instant gravity dump. It's controlled by a simple body latch and new dump lever

arrangement. Gravity dumping eliminates slow-acting, troublesome body hoists — never balks, never wears out. Notice, too, the new streamlined, all-steel body. Even with all this heavy-duty strength, Dumptor still has more than 6 h.p. for every ton of loaded weight. It accelerates fast, pulls through soft ground and up grades with less shifting — climbs 24% grades fully loaded.

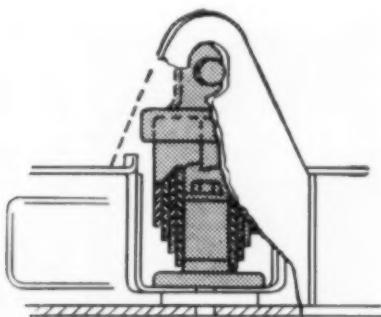
Let your Koehring Distributor give you all the latest Dumptor® facts. See him soon, or write.

KOEHRING COMPANY

MILWAUKEE 16,
WISCONSIN

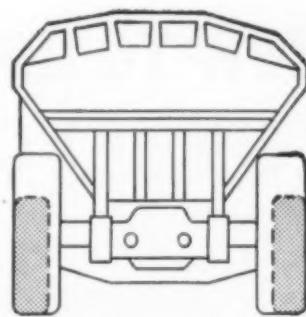


Subsidiaries: PARSONS
KWIK-MIX • JOHNSON



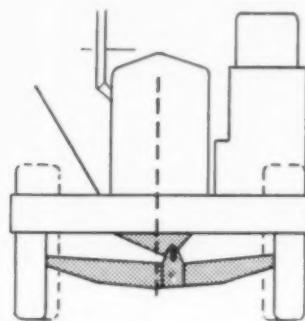
Smooth ride

Heavy, snubber-type spring is mounted between Dumptor main frame and the steering axle. Shock-absorbing action provides plenty of "cushion" — takes all the jolts out of rough, off-road travel. Easy on operator and machine.



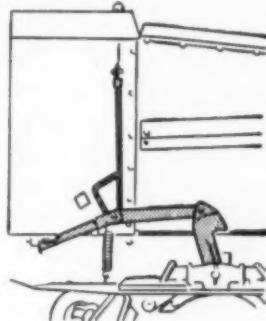
Tires track in direct line

Wider, heavier steering axle puts Dumptor steering wheels in direct line with big drive wheels. Tires track in the same path. There's less rolling resistance, better traction in soft ground, and on rough haul roads.



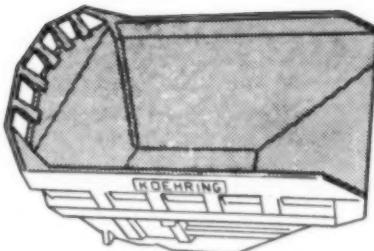
Off-set pivot on axle

Pivot point on steering axle is off-set from center line 3 1/4" toward operator side of machine. There's no sag, even with unbalanced load. Steering axle oscillates up to 21" — keeps twisting strains out of Dumptor main frame.



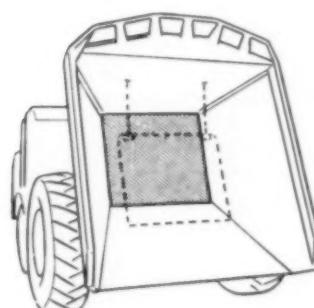
New body-latch, dump lever

Body latch for 1-second gravity dumping is simple, trouble-free. Latch is engaged by a single hook, mounted on the chassis frame. Dump lever is located inside the cab, in an easy-reach position to left of operator.



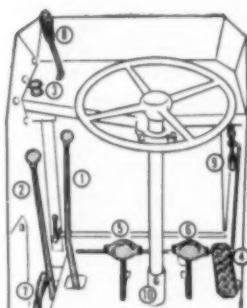
Streamlined, all-steel body

Inside is free of bulges or ledges. Top edge is box-beam constructed. Sides, ends are ribbed with 5 and 8" channels. Double-plate bottom is lined with multiple steel beams. Note ridge bar added to sturdy rock-guard teeth.



Bolted or free-swinging pan

Heavy steel kick-out pan is 1/2" thick. Pan can be bolted to body floor for extra protection when loading rock. Remove bolts, and pan has free swinging kick-out action — breaks suction when dumping wet or sticky materials.



Easy-reach controls:

(1) Speed gear shift lever, (2) directional gear shift lever, (3) starting aid, (4) foot throttle, (5) clutch pedal, (6) brake pedal, (7) parking brake, (8) body-release lever, (9) hand throttle, (10) running lights control switch.

HOW TO BUY CONVEYOR

and get...
MORE USE PER DOLLAR
where
SPECIAL ENGINEERING
is needed

Look for a make of belt backed by experienced, specialized engineering service.

Selecting the right conveyor belt to solve a special problem begins with selecting the right representative . . . one who will take interest in your particular belt needs and refer your problems to his factory if engineering help is required. Where a company makes a wide selection of conveyor belts for many applications, the representative can often recommend a feature construction to meet your job requirements. Where your problem is unique, that company backs its field men with custom engineering and comes up with a recommendation to meet your specific operating conditions.

Choose the company that offers complete belt engineering service . . . the source of supply that maintains close contact between factory and field.



RAYBESTOS-MANHATTAN CONVEYOR BELT ENGINEERING

A leading steel mill, faced with handling hot sintered ore without an insulating layer of "fines", had numerous belt failures due to charring.

An R/M representative called in a factory engineer. A new custom-engineered R/M conveyor belt with special cover now saves hundreds of dollars a year at the mill.

and . . . where hot ash and clinker was wearing out a conveyor belt every month at a Michigan cement plant, an R/M field man was able to furnish a specially engineered Homocord Belt which has outlived the best previous belt four times over. and . . . special, "chevron cleated" conveyor belt was developed by

R/M, as a result of a field representative request, to replace a smooth surfaced belt unable to carry wet iron ore up a mine slope without costly spillage.

These are just a few of many instances where R/M engineering service has solved conveyor belt problems. In other cases, special job requirements have been met with R/M's exclusive constructions such as extra-flexible Ray-Man "F" . . . extra-cushioned Homocord for shock-loading . . . and Ray-Man Tension-Master for extra-high tensions and long lifts.

Let an R/M representative show you why R/M engineering makes R/M Conveyor Belts last much longer . . . give you "More Use per Dollar".

R-M-102-100



MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.



Flat Belts



V-Belts



Conveyor Belts



Hose



Roll Covering



Tank Lining



Abrasive Wheels

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings • Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Bowling Balls

ROEBLING ANNOUNCES TO AMERICAN INDUSTRY IT'S NEW ROYAL BLUE WIRE ROPE...



**STRONGER THAN YESTERDAY'S STRONGEST!
VASTLY INCREASES — EVEN DOUBLES — SERVICE LIFE!**

WITH THE DEVELOPMENT of Roebling type 1105 wire — the finest high carbon rope wire ever produced — Roebling leads the field in bringing American industry the unprecedented efficiency and economy inherent in its new **ROYAL BLUE** Wire Rope.

★ Roebling is ready to supply the new **ROYAL BLUE** Wire Rope in **EVERY DIAMETER** from $\frac{1}{4}$ " to $3\frac{1}{2}$ " and in **EVERY STANDARD CONSTRUCTION** with an independent wire rope core.

★ Roebling guarantees **ROYAL BLUE** Wire Rope to be at least 15% stronger than any standard wire rope of the same size and construction formerly available.

★ Roebling **ROYAL BLUE** Wire Rope has unequalled resistance to impact, crushing, abrasion and fatigue.

Write us for the full story on **ROYAL BLUE** Wire Rope, or contact your distributor or nearest Roebling branch office.

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 81 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5240 E. HARBOUR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.





Four TR-200's work up to 460 hours a month ... average only 4 hours down time

In less than a year, the George W. Kerford Quarry Company, Atchison, Kansas, put 3,828 hours of work time on each of their four Allis-Chalmers TR-200 Rock Wagons. They piled up 460 hours a month over one five-month period. During the year, service down time for each unit averaged only 4 hours a month . . . this means that each rock wagon was on the job over 98 percent of working time!

The TR-200's have been hauling quarry stone from the pit to a crushing plant 1½ miles away. Loads average 16 tons and each cycle is completed in 14 min. Fuel consumption has been about 3¼ gal per hour with no oil needed between changes.

George E. Kerford states, "We like the TR's maneuverability and easy control, which makes it possible for any good truck driver to learn to drive the outfit quickly. The wagon body is well constructed and cleans easily and completely. We find that most parts needing frequent maintenance and repair are easily accessible."

**Write for complete catalogs
or ask your Allis-Chalmers dealer
for a demonstration**

HERE ARE THE FEATURES BEHIND THIS OUTSTANDING RECORD



Big bowl top makes excellent target for shovel or dragline operator, helps loading under bins or chutes.



High power-to-load ratio of 16 hp per yard of capacity speeds hauling, helps on steep grades.



Maximum lift angle of 70 degrees speeds dumping of any type material. Big opening and "bathtub" design slide loads out fast at minimum dump angles.

Dumps 30 in. back of rear wheels to put entire load over banks or into hoppers.

Wheel base stays fixed during dumping cycle for greater safety on banks, accuracy in spotting loads.

Four-wheel air brakes allow full control, safer dumping over banks.

Hydraulic control system raises or lowers bowl while traveling, gets TR-200 into position sooner.

**176 hp engine — 5 speeds forward to 21.6 mph, reverse
2.5 — 11 yd struck, 15 yd heaped, 18 tons**

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U.S.A.

TEN X COAL CO.



Are *You*
getting your share
of the
COAL BUSINESS

FIRST CLASS
PERMIT No. 93
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BUSINESS REPLY CARD
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These Leaders Can Compete—

McNALLY PITTSBURG PLANTS HELP THEM DELIVER FUEL THAT IS
BETTER WASHED, BETTER SCREENED, BETTER DRIED

at lower cost per ton!



STATE YOUR PROBLEM HERE OR ON YOUR LETTERHEAD

I am interested in

- Washing " x 0 at tons per hour.
- Screening " x 0 at tons per hour.
- Drying " x 0 at tons per hour.

Name _____ Title _____

Company _____

City and State _____

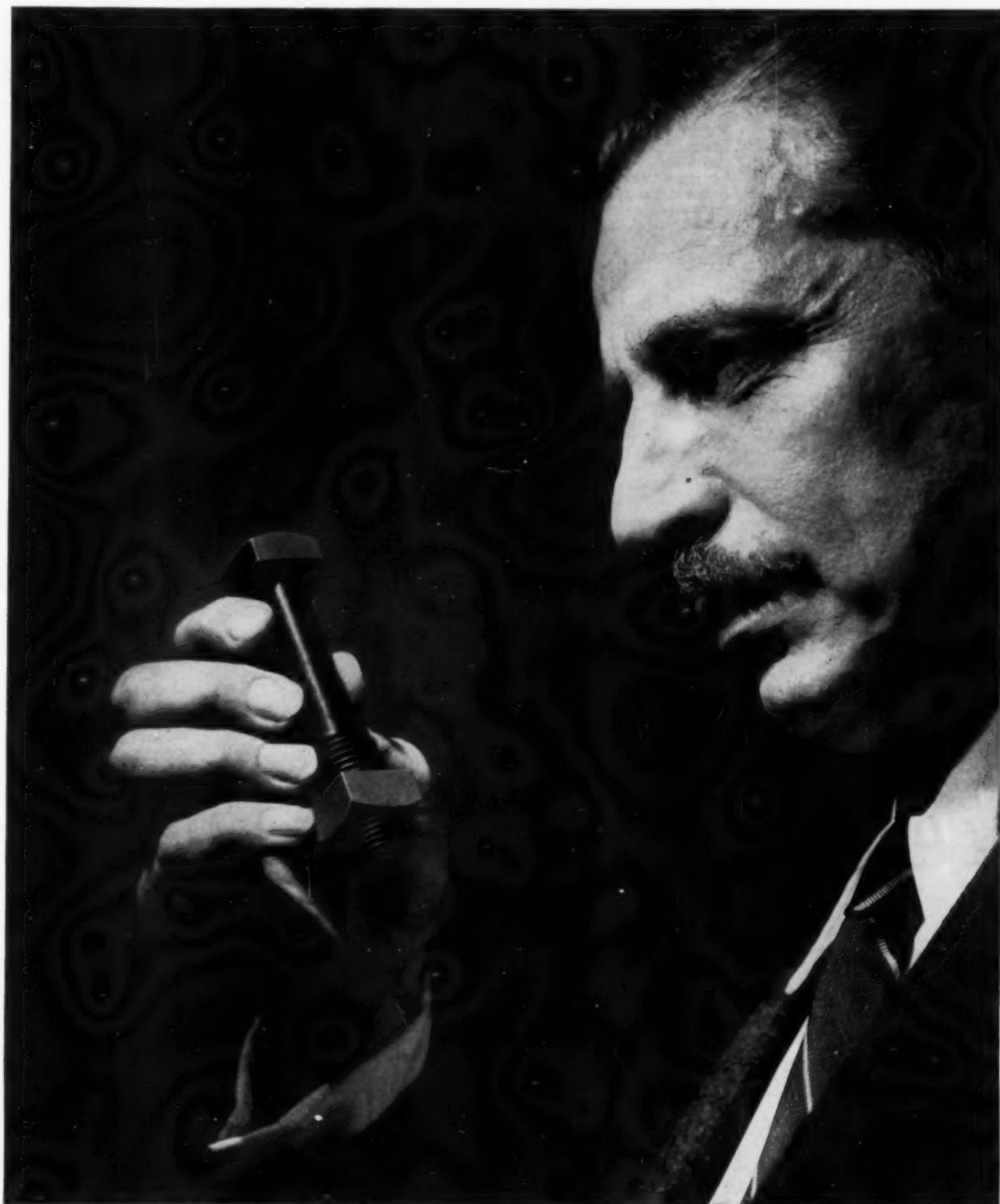
- () Have Sales Engineer call for further consultation.
- () Send additional information.

You, too, can compete—
with better prepared
coals—at lower cost
per ton

Ask

M'NALLY • PITTSBURG
MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

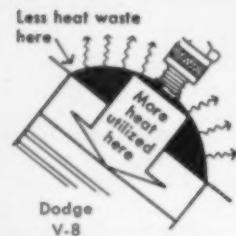
The Men Who Know Coal from the Ground Up
McNally Pittsburg Manufacturing Corporation—Manufacturing Plants: Pittsburg, Kansas • Wellston, Ohio
Engineering and Sales Offices: Pittsburgh • Chicago
• Rio de Janeiro • Pittsburg, Kansas • Wellston, Ohio



"We've always admired Bethlehem Machine Bolts for
their neat appearance and consistently high quality."

Machine and carriage bolts, too!





Less surface area, less heat lost

Rounded exclusive Power-Dome combustion chamber has less surface area than irregular chambers. Thus less heat is dissipated into cooling system, more heat is utilized within the chamber to expand gases more fully, give greater thrust to piston.

Dodge avoids power-stealing hot spots

Power-Dome combustion chambers are rounded, have no corners or pockets in which carbon deposits can build up. Such deposits become red-hot, pre-ignite the fuel-air mixture, cause engine knock and loss of power, lead to costly repairs.

Short flame travel, better valving



With Power-Dome combustion chambers, the spark plugs are located at or near the center. Thus the flame has a shorter distance to travel, combustion is more even. Large unrestricted valves mean better "breathing" and greater efficiency.

How you
get more power,
use less gas with
POWER-DOME V-8 truck engines!



Truck owners everywhere report more power and less fuel consumption with new Dodge Truck Power-Dome V-8 engines. AAA-supervised tests proved the power of Dodge Truck V-8's in a history-making Pikes Peak climb . . . proved the economy of Dodge Truck V-8's in a sensational 22-mile-per-gallon Economy Run.

Look at the pictures and captions shown on this page—then, for further details and an eye-opening road test, see your dependable Dodge Truck dealer!

DODGE "Job-Rated" TRUCKS
A PRODUCT OF CHRYSLER CORPORATION

Where there is mechanized coal mining...

FIRTHITE "Blue Bits" ARE STOCKED



ROOF BITS

Firthite "Blue Bits" for roof drilling are made in 3 styles: RD-L for light uses and very soft roof rocks; RD-H with extra heavy duty insert to resist gage wear for most difficult roof drilling; RDS (slotted) for faster drilling of medium to hard roofs. All are water channeled for either wet or dry work.

Mr. Tooley says—



Because Firth Sterling makes both steels and carbides, "Blue Bit" mining tools are as perfect as integrated production and engineering can make them. Both the carbide inserts and the alloy tool steel shanks are produced under controlled conditions by one company for maximum quality and operating effectiveness!

In all the major coal producing areas of the country Firthite famous "Blue Bit" mining tools are available from stock from Firth Sterling distributors. More than just "availability," however, recommends them to your use.

Firthite Quality Carbides

Firthite mining inserts have been metallurgically engineered to withstand the severe shocks and abrasion of drilling in all types of formations, and tip designs assure free cutting and low power consumption.

Premium Alloy Shanks

A carbide tool is no better than its shank! "Blue Bit" shanks are drop forged from premium alloy steels, machined to uniform dimensions and skillfully heat treated to the proper degree of hardness and toughness to withstand the high torques and pressures encountered in mining uses.

Controlled Quality

Shanks and tips are bonded together with premium quality silver alloy, resulting in what field tests have shown to be the strongest braze in any carbide mining tool—all carefully *controlled* by frequent Izod impact testing to a measured impact and statistically checked.

Engineering Service

Too, there's a Firthite Engineer located in your coal producing area, always ready to become familiar with your operations and to assist in solving your cutting, drilling and roof bolting problems.

DRILL BITS

Firthite "Blue Bits" for rotary drilling available in 3 styles: D with either square or hex shank for use with any standard drilling equipment; DV (illustrated) for faster and easier hand held drilling.

MACHINE BITS

Firthite "Blue Bits" for mining machines encompass a line including a bit design, style and grade for every need. C-4-H (illustrated) is one of several designed for use in non-pure veins where the going is tough and on continuous miners.

FINGER BITS

Firthite "Blue Bits" for use in standard drill heads feature two-surface brazing with tips set in recesses for greater strength. Available in all popular sizes.



Firth Sterling

—INC—

GENERAL OFFICES: 3113 FORBES ST., PITTSBURGH 30, PA.

OFFICES AND WAREHOUSES*: BIRMINGHAM CHICAGO* CLEVELAND DAYTON DETROIT* HARTFORD* HOUSTON LOS ANGELES* NEW YORK PHILADELPHIA PITTSBURGH WASHINGTON WESTFIELD, N.J.

PRODUCTS OF FIRTH STERLING METALLURGY

High Speed Steels

Tool & Die Steels

Stainless Specialties

High Temperature Alloys

Sintered Tungsten Carbides

Firth Heavy Metal

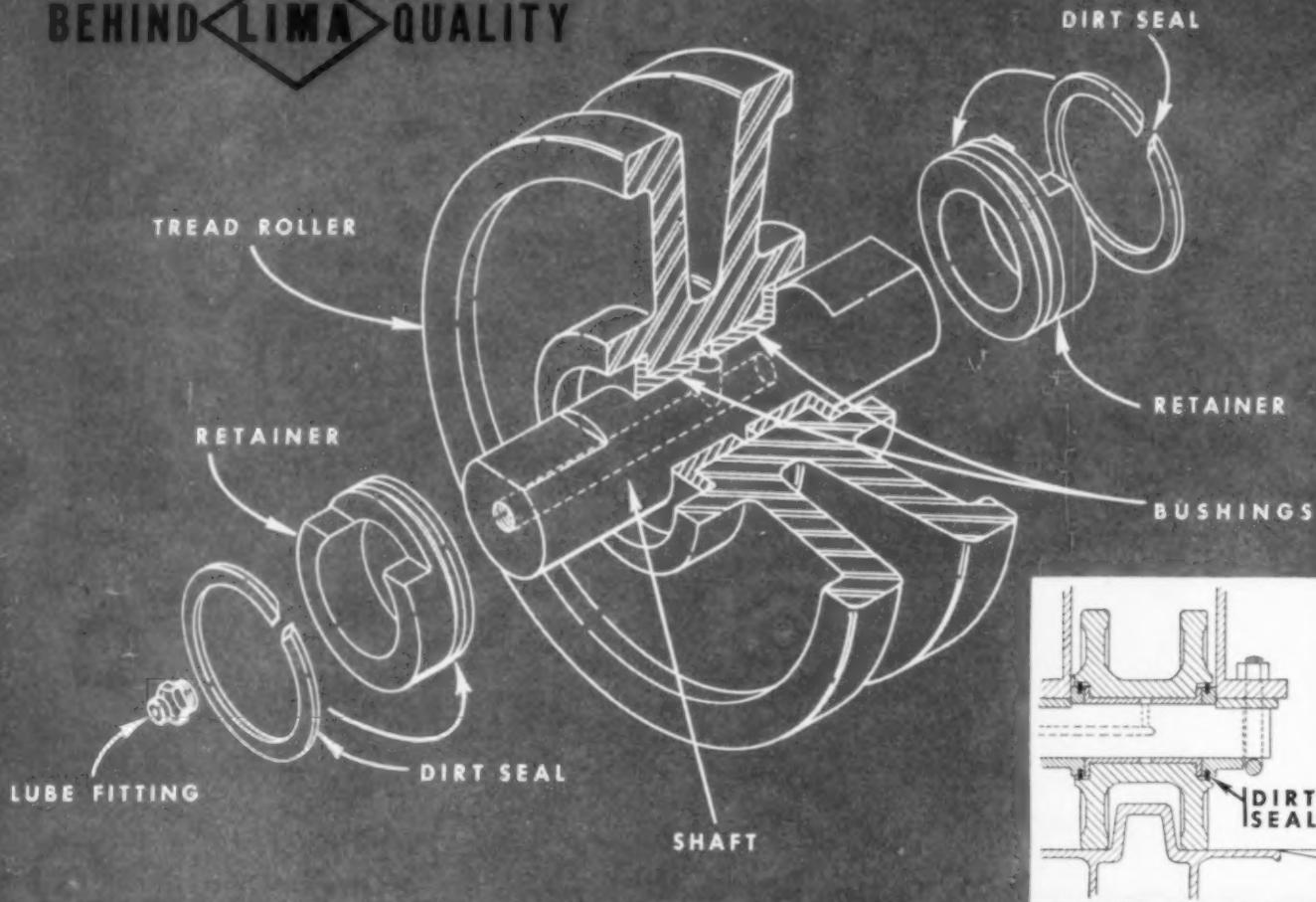
Chromium Carbides

High Temperature Cermet

Zirconium



BEHIND  QUALITY



LIMA dirt seals cut down-time and maintenance costs

Effective piston-ring-type dirt seals in the tread rollers are another quality "extra" you get when you use a LIMA. Abrasive material which wears out the bushings and shafts of ordinary machines is excluded. LIMA seals the lubricant in and dirt out to reduce friction and prolong the life of bushing, roller and shaft.

COMPARE QUALITY! No other machine gives you as much as LIMA!

1. Piston-ring-type dirt seal rings and retainers.
2. Moving parts are flame or induction hardened for longer life.

This LIMA demonstrates the importance of LIMA'S dirt seals and grease retainers.

3. Main machinery is placed well back of the center of rotation.
4. Anti-friction bearings at all important bearing points.
5. Big capacity drums and sheaves.
6. Propel and swing gears and power take-off are enclosed in a sealed oil bath.
7. Torque converter (optional).
8. Wherever you are, you can depend on skilled service and nearby warehouse stocks of parts.

The features listed above contribute to LIMA'S greater output with less down time and lower maintenance costs. Users agree! It costs less to own a LIMA!

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD



LIMA SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

BALDWIN-LIMA-HAMILTON

Construction Equipment Division • LIMA • OHIO • U.S.A.

NEW
RED SADDLE
shuttle car cable

lasts 4 times as long*



Take the average life of the shuttle car cable you're now using. Multiply it by four. And you get the *minimum expected life* of the new Hazacord Red Saddle Hex-Tite Twin for shuttle car service.

The reasons for this greatly increased life expectancy? Look at the red portion of the illustration—that's a *pre-formed* protective wall of red neoprene which assures a uniformly thick fill between conductors . . . gives added security against short circuiting due to run-overs by heavy equipment . . . locks Hex-Tite conductors in place to prevent internal slippage.



Now available to the mining industry for the first time, Red Saddle has all the other features that have made Hazacords first choice for rugged shuttle car service:

1. Hex-Tite non-slipping construction for longer life.
2. Compensated stranding to prevent opening-up of conductor strands when flexed.
3. Strong, resilient, heat-resisting insulation.
4. Tough, flame-proof, moisture and abrasion-resistant sheath.
5. Shaped conductors locked in place by solid sheath.
6. Extra flexibility for high-speed reeling.

*Actual tests on the special testing machine developed by Hazard engineers to simulate the pulling, twisting and bending of the severest mining machine service showed the new Red Saddle Type G Twin withstood more than four times the test cycles of old style Twin Type G.

And Type G Red Saddle Twins have a special *round* ground instead of the old-fashioned flat type. This exclusive design provides maximum protection between ground wire and power conductors, adds flexibility to the cable, markedly reduces ground wire breakage and consequent cable failures.

For full details on the new Hazacord Red Saddle Hex-Tite Twin, see your Hazard representative or write to Hazard Insulated Wire Works, Division of The Okonite Company, Passaic, N. J.



HAZACORD
Mold-Cured
portable cables

Trade-Mark applied for.

PRODUCT OF
 OKONITE
 RESEARCH

2723

41





How a heavy-rail system can cut down haulage costs

In these days of heavier motive power, larger cars and longer trains, the haulway can become a treacherous bottleneck to production. Chief villain, of course, is the track itself: rail that is too light for modern traffic and badly worn from overloading. The problem is compounded where the working face stands three or four miles from shaft bottom or mine entrance.

If you suspect that this description fits your workings, it's time for a talk with Bethlehem. One of our engineers will learn your needs, in discussion with you and in a survey of your property. Then we'll design a new system that will fill your bill to the letter.

After you approve the plans, your new layout will be

completely prefabricated at our plant to ensure that it will fit perfectly at yours. Not a detail will be overlooked; every splice bar, track bolt and frog plate will be there, keyed to the master plan.

This is the safe way, the easy way (and, yes, the economical way!) to bring your haulage system up to date, and your mining costs down to bedrock. This is the way adopted by leading mines throughout the coal industry. The sooner you get started, the sooner you save. All it takes to get started is a phone call or letter to our nearest sales office.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

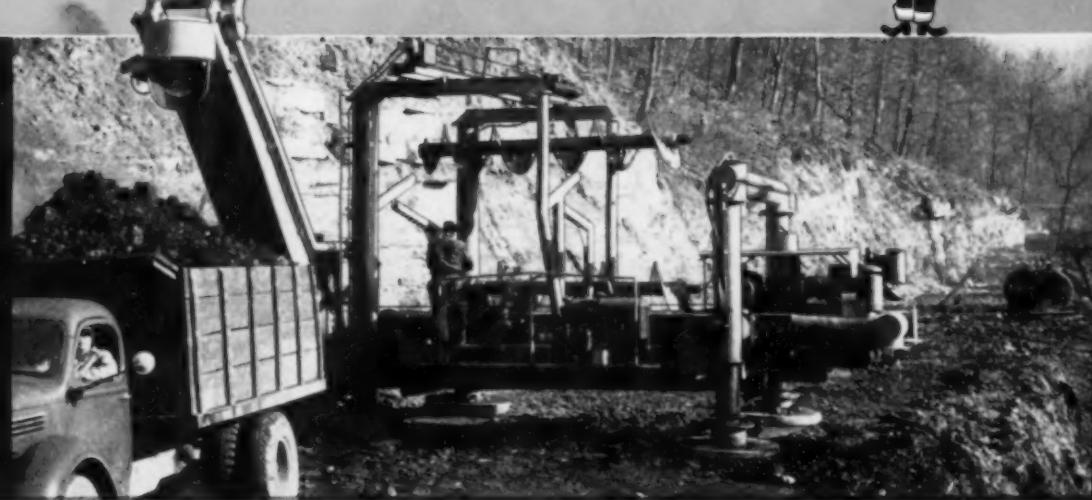


SMALL but

MIGHTY!



**The
all
new**



Compton Budget Model 28 Coal Auger

Ideal for narrow pits and short benches

Here it is! The mighty mite of the Compton Coal Auger family—Model 28—designed, like its big brothers, to raise production figures and cut operating costs—This new machine will produce up to 50 tons per hour. Only 28 feet long, light weight and easily

moved from pit to pit with optional available tail wheel assembly, this Compton Coal Auger enables a 3 man crew to efficiently handle tough mining assignments in pits and/or benches as small as 30 feet—augering to a depth of 150 feet.

Model 28 incorporates many of the time-proven features found only in Compton Coal Augers:

- 1 Model 28 with all size cutting heads drills coal within 4 $\frac{3}{4}$ " of the bottom—assuring maximum recovery.
- 2 Easily accessible auger sections racked on the frame.
- 3 Elevating conveyor is integral part of the machine.
- 4 Hydraulic jack legs (with self-leveling pontoons) allow drilling up to 150 feet without misalignment.
- 5 Single or vertical overlapping holes can be drilled for greater recovery.
- 6 Easy to move along working face of highwall.

It will pay you to look into the advantages of the Compton Coal Auger. A Compton representative will help you review your property for the proper auger application.



GENERAL SPECIFICATIONS MODEL 28

Length: 28 feet
Weight: Approx. 25 tons
Carries 12—12½ ft. auger sections
Required pit width: 30 ft. min.
Power: 150 hp Diesel engine
Hydraulic Frame Jack Lift: 54 inch
Auger Diameter: 44" to 28"
Max. Drilling Depth: 150 feet

Cutting Head: Compton non-clogging type with built-in spider bearing assembly provides straighter drilling with less frictional drag.

Compton, Inc.
ORIGINATORS OF COMPTON LUMP RECOVERY HEADS

BOX 1946 • TELEPHONE 4-6384 • CLARKSBURG, WEST VIRGINIA



PROBLEM: CABLE FAILURE...

new cable needed • downtime • idle
machinery • repair expenses • lost tonnage



Check these service advantages before you buy another foot of mining cable

Any mine cable will fail, eventually. But here's how you can minimize the trouble cable failures cause you.

You can buy the best. And you can buy the best for less when you count its cost in terms of less cable replacement, less lost production, less repair crew expense and less general inconvenience.

How can you tell the best? A check of this list of quality cable features can help you answer the question—and save you money. It's a list of advantages of Rome 60 parallel duplex car cable.

1. FLEXIBLE—Tough Neoprene webbing separates grounding conductor from insulated conductors. This gives you . . . high impact resistance, low conductor fatigue, better protection against "shorts" and maximum flexibility.

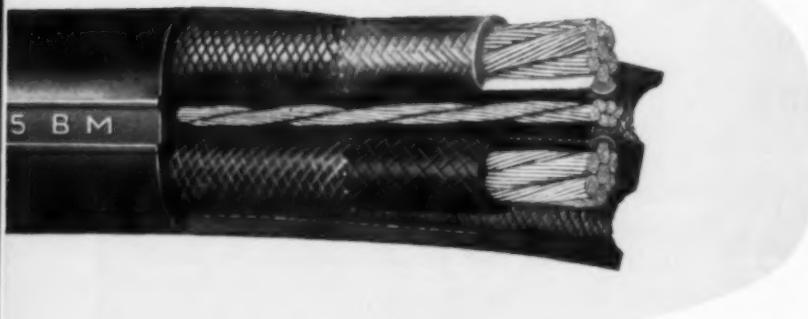
2. INTERLOCKED CONSTRUCTION—This cross section shows what interlocked construction is . . . the open braid around each conductor locks the conductor to the Neoprene sheath. This interlocked construction prevents separation of conductors from sheath by twisting, pulling and flexing.

3. OVERLOAD PROTECTION—The insulation is compounded for heat resistance to permit continuous operation at 75°C. (167° F.) and adequately protects against deterioration at high overloads often experienced.

4. THE NEOPRENE SHEATH—Tire-like toughness given by the molded-in-lead Neoprene sheath protects your cable against impact, acids, oils, abrasion and flame.

5. MEETS CODES—The Neoprene sheath, marked P-105 BM, conforms to State of Pennsylvania and Bureau of Mines Safety Codes. When you invest in Rome 60, you make your total investment in men and machinery pay off best.

HERE'S HELP



QUALITY FOR YOU...

engineered and built into Rome 60 Types W and G parallel duplex and . . .

- Multiple-conductor power cables—Types W and G
- Type SO portable cords
- Single-conductor locomotive cable
- Mine power distribution cables
- Shovel and dredge cables
- Shot firing cord

It Costs Less to Buy the Best

Come to the Cleveland Coal Show . . .
Visit us in Booth 1205



ROME CABLE
Corporation
ROME - NEW YORK
and
TORRANCE - CALIFORNIA

on the tough jobs
you'll always see **Manitowoc**



**Manitowocs are a
big producing team for
Benjamin Coal Company,
Ansonville Pa.**

When the going is rough and rugged — you'll always find Manitowocs on hand to do the job. Profitable performance on tough operations is a Manitowoc specialty.

Here are 3 Manitowocs "putting out" for Benjamin Coal Company near Ansonville, Pa. — a Model 4500 dragline with 6 yard bucket and 120' boom strips from topside — in the pit a versatile 1½ yard Model 2000 shovel covers a lot of ground,

loading, cleaning and preparing — and in the background, a Model 3500 Hi-Lift shovel strips overburden at a record rate. Look into Manitowoc's superiority — check such outstanding features as: faster working cycles, faster travel speeds, long reaching booms, top stability and simple but sturdy design and construction.

These are just some of the reasons why you see more and more Manitowocs on more and more stripping and mining operations. Send for details. Manitowoc Engineering Corp., Manitowoc, Wis.

MANITOWOC

SHOVELS
1-5 Y.D.



CRANES
18-100 TON

**buried
profits from
"stripped-out"
mines**

CARDOX AUGER MINER

salvages high-profit tonnage "lost" under excessive overburden

- Nets up to 50 tons per man shift.
- Drills back 100 feet or more into already exposed seam.
- Produces coal ready for mechanical loading, practically free of rock and shale.
- Gasoline or diesel engines, 155 H.P., handle augers that drill holes up to 38 inches in diameter.

● GET THE COST AND PROFIT FIGURES FROM YOUR CARDOX REPRESENTATIVE OR WRITE FOR FREE COPY OF CARDOX AUGERMINER BULLETIN

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Murray 4-4464



Heavy fluids can't hinder working parts in these CRANE VALVES

THIS CASE HISTORY tells how the United States Playing Card Co., Cincinnati, solved—with Crane Diaphragm Valves—a costly problem of piping heavy enamels for paper coating.

The trouble was in the plug cocks and conventional gate valves formerly used in the enamel lines. During normal shutdowns the heavy liquid would build up on seating surfaces, in stem threads and working parts. The cocks and gates would "freeze up" . . . were hard to operate . . . couldn't be shut tight. The condition hampered production . . . made floors messy and dangerous . . . pushed maintenance costs sky-high.

Replacing with Crane Packless Diaphragm Valves stopped the trouble completely. Their sealed-to-fluid bonnet and pliable neoprene disc insert did the trick. After more than 4 years, all 48 Crane valves installed—with no maintenance whatsoever—are still seating tight . . . still operating freely and smoothly.

CRANE PACKLESS DIAPHRAGM VALVES

Working parts are safely out of contact with line fluid. The diaphragm seals the bonnet—that's all it does, giving it longer life. The independent disc with pliable insert seats tightly on foreign particles or seat deposits . . . and controls fluid, even should diaphragm fail. See your Crane Catalog or Crane Representative for wide selection of body, bonnet, and trim materials in these valves for countless uses.

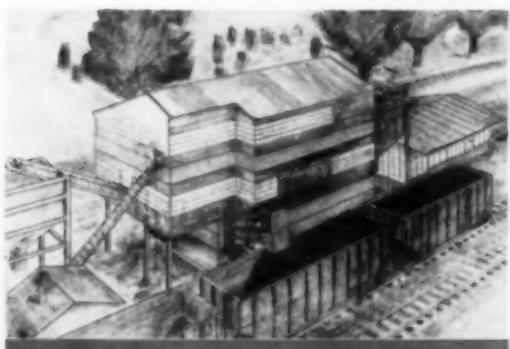


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Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • KITCHENS • PLUMBING • HEATING

CRANE'S FIRST CENTURY . . . 1855-1955



Modern Coal Refinery in Central Pennsylvania using DMS. Started Feb. 1955.



Here's a West Virginia (DMS) Plant that is turning out 3000 tons of premium coal per day.



The DMS System at this Virginia Plant means profits rolling in at the rate of 2000 tons per day.



Standard DMS Coal Washing Units like this one are available in capacities up to 700 tons per hour.

"DMS"

*A Good Way To Raise Coal Production Up To Peak Capacity

Yes, it's a matter of record that every DMS built Coal Refining Plant has a comfortable backlog of orders for DMS prepared coal. The DMS Dense Media System is helping many operators back to a full schedule. Full time operation, premium prices and lower operating costs are being experienced by every operator of a DMS Coal Preparation Plant.

Add to this the fact that many brokers prefer coal prepared by the DMS System—and it's easy to understand why there were twice as many DMS Plants sold in 1954 as all competitive systems combined.

The reason—More Profits. The DMS Dense Media System is nearly 100% effective on any coal seam, with the smallest percentage of misplaced material in the industry . . . More clean coal. Starts or stops in two minutes . . . Saves on power and time. One-man operation . . . Lower cleaning costs. Push-button controls . . . Exact control of quality. Compact, practical design . . . Fewer parts and lower maintenance costs.

* 7 DMS Washers In 1954



dense media system

Send us a brief outline of your cleaning problem.
Let us make a careful, thorough analysis.

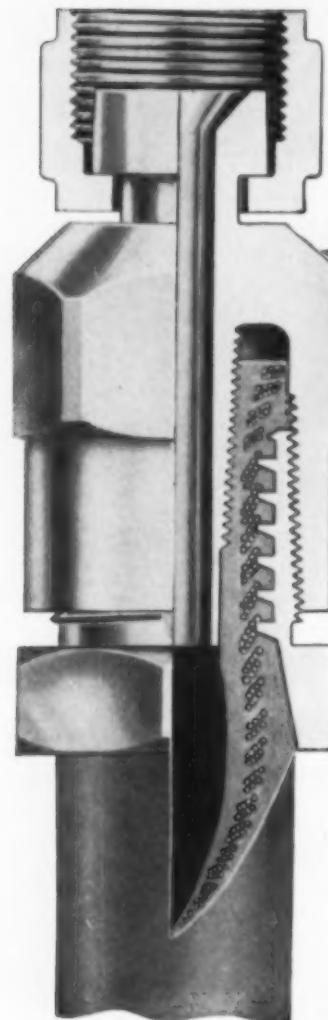
Write today for illustrated brochure—No. CW-250. Free

THE DANIELS COMPANY

26 North 5th Street

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Branches In: BLUEFIELD, W. Va. and NEWARK, N.J.



ANNOUNCING - JOY SURGEPRUF

HYDRAULIC HOSE and RE-USABLE COUPLINGS

The NON-SKIVE COUPLING
with the "DOUBLE-WEDGE GRIP"

1 PERMITS THE USE OF MORE ABRASION-RESISTANT, RUBBER-COVERED HOSE

Now you can *insure* longer wear in your hydraulic hose assemblies! You can use tough, abrasion-resistant, rubber-covered hose instead of braided hose—and at the same time you can save assembly time by avoiding old-fashioned skiving. Joy Surgepruf couplings make *both* advantages possible. Their exclusive "double-wedge" grip lets you secure the extra long-wearing qualities of rubber-covered Surgepruf Hose without any need for skiving the hose at the connection.

2 NO SPECIAL ASSEMBLY TOOLS REQUIRED

No mandrels or other special tools are required to make up Surgepruf assemblies . . . no extra expense or special technique is involved.

3 CAN BE RETIGHTENED WHEN LOOSE ON THE HOSE

Machine vibration or hose flexing can loosen any hydraulic coupling on the hose in time, but Surgepruf Couplings can be easily, quickly retightened on the job to stop a leak—*another* exclusive feature.

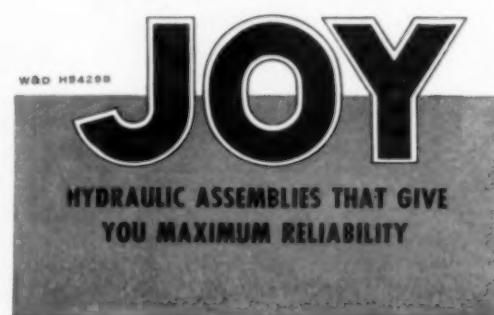
Surgepruf Hose Couplings are made to JIC Standards. Assemblies are available in many sizes and lengths, and in both single and double-wire reinforced types for medium-high and high pressure service respectively.

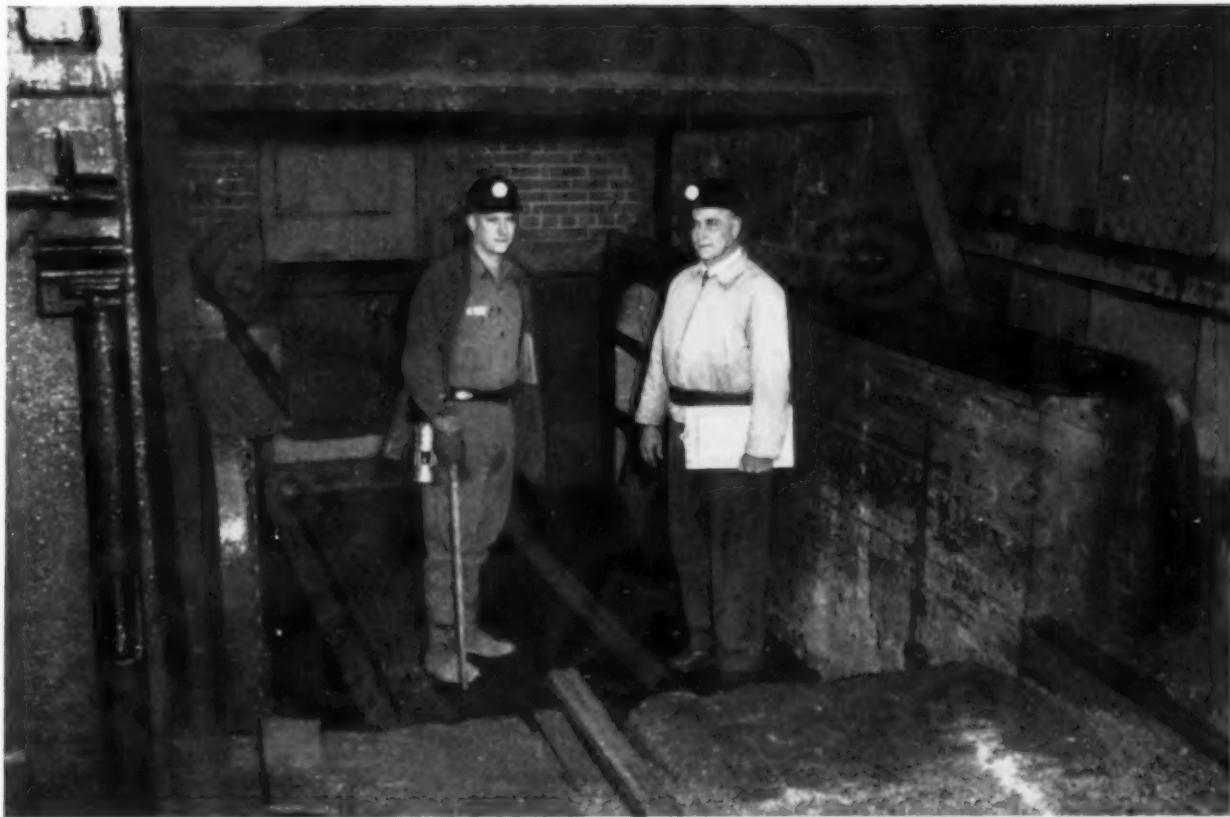
These hydraulic hose assemblies, as shown above, are interchangeable with the assemblies now in use on any hydraulically-controlled equipment you may have. • Order replacement sizes for your machines—prove the merits of Surgepruf for yourself. Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.



Consult a Joy Engineer

Get complete data on Surgepruf:
WRITE FOR BULLETIN H-100F





He minds your business well

The man at the right is an Amoco Mine Lubrication Engineer. When he surveys lubrication needs in a mine operation his recommendations generally *reduce* the number of lubricants in use. He's able to increase lubricating efficiency while reducing cost per ton.

FEWER LUBRICANTS . . . FASTER SERVICE!

You gain *two ways* with Amoco Mine Lubricants, with prompt deliveries assured through local plants scattered everywhere in AMOCOAL territory.

Call or write your nearest Amoco office

AMOCO LUBRICANTS

... SAFE • SURE FOR MINE MACHINERY

AMERICAN OIL COMPANY • FROM MAINE TO FLORIDA

(PLEASE GIVE THIS ADVERTISEMENT
TO YOUR BLASTING FOREMAN)

To connect a Branch Line
with the Trunk Line
Use this HALF HITCH for Plain and Reinforced
Primacord. Draw it up as tight as you can,
and be sure the Branch Line leads off at a
RIGHT ANGLE to the Trunk Line.

Stray ELECTRICAL CURRENTS DON'T DETONATE PRIMACORD



Unwanted electrical energy is on the increase. The sources are several: a bolt of lightning several miles away, static, radio transmitters, galvanic action, transmission lines, power cables to electrically operated equipment . . . Under certain conditions any of these sources could set off a blast prematurely.

Not so when the holes are primed and hooked up with Primacord. For Primacord is the *insensitive* detonating agent.

It cannot be set off by sparks, friction, ordinary shock, stray currents — and even a direct hit by lightning failed to detonate it!

Only when the blasting cap is attached at the firing end of the Primacord trunk line is the blast ready to go. And, of course, you do this only when everything's all set.

For more information see your Explosives Supplier, or write to
THE ENSIGN-BICKFORD COMPANY • SIMSBURY, CONNECTICUT
Primacord — Quarrycord — Ignitacord® — Safety Fuse
Blasting Accessories — Established 1836

To connect a
Branch Line of Plastic
Reinforced or Plastic
Wire Countered Primacord
with the Trunk Line

use this DOUBLE HITCH in the
textile-covered Primacord Trunk Line. Draw it up as tight as you
can, and make sure that the
Branch Line leads off at a
RIGHT ANGLE to the Trunk Line.

PRIMACORD® DETONATING FUSE

PROVED AND APPROVED

To lengthen a Trunk Line
of Plain or Reinforced Primacord, tie a SQUARE KNOT.
Draw it up as tight as you can — it won't slip back. Caution:
don't use any knot in a hole — it might break or hang up explosives when loading.

To connect
the Detonator with the
Primacord Trunk Line

use FRICTION TAPE. You can detonate Primacord with fuse and cap or electric blasting cap. Lay the cap alongside of the Primacord with the business end of the cap pointing in the direction that the Primacord will detonate. Tape the two snugly together, so that you have a tight connection.

Cut the
Primacord off
the Spool Immediately

Make this a safety habit! As soon as you have taken off the length of Primacord you need for a down-hole or for a trunk-line, cut it off the spool! Don't waste a second — do it now!

**Devoted to the Operating, Technical and Business Problems
of the Coal-Mining Industry**



MARCH, 1955

IVAN A. GIVEN, EDITOR

Again in '55?

FOR ALMOST LONGER than the memory of the coal man runneth not to the contrary, peace has reigned in relations with John L. Lewis. Will the even tenor of this existence continue or is the end of an era at hand?

Prophecy is necessarily an uncertain business and guessing Mr. Lewis is an especially hazardous form of soothsaying. But the thinkers checked by the editors recently, who to a man are willing to be described as "smart" in everything but this, feel that peace will linger, perhaps lengthily. If Mr. Lewis didn't make a move last year, presumably for reasons satisfactory to him, has the situation, they ask, changed sufficiently to warrant a move this year? Answer? "Some—but not enough, at least so far."

Production has picked up but 1955 isn't going to be a boom year either in tonnage or realization, and a new series of heavy demands backed up by a strike threat undoubtedly would result in substantial additions to the nonunion ranks. In the absence of a boom in coal, ordinary logic indicates maintenance of the status quo for some time to come, or, at the most, a simple reaffirmation of intent to continue relations in a new agreement differing only in minor respects from the old. Perhaps ordinary logic and Lewis logic will coincide again in 1955 as in 1954.

Better and Better

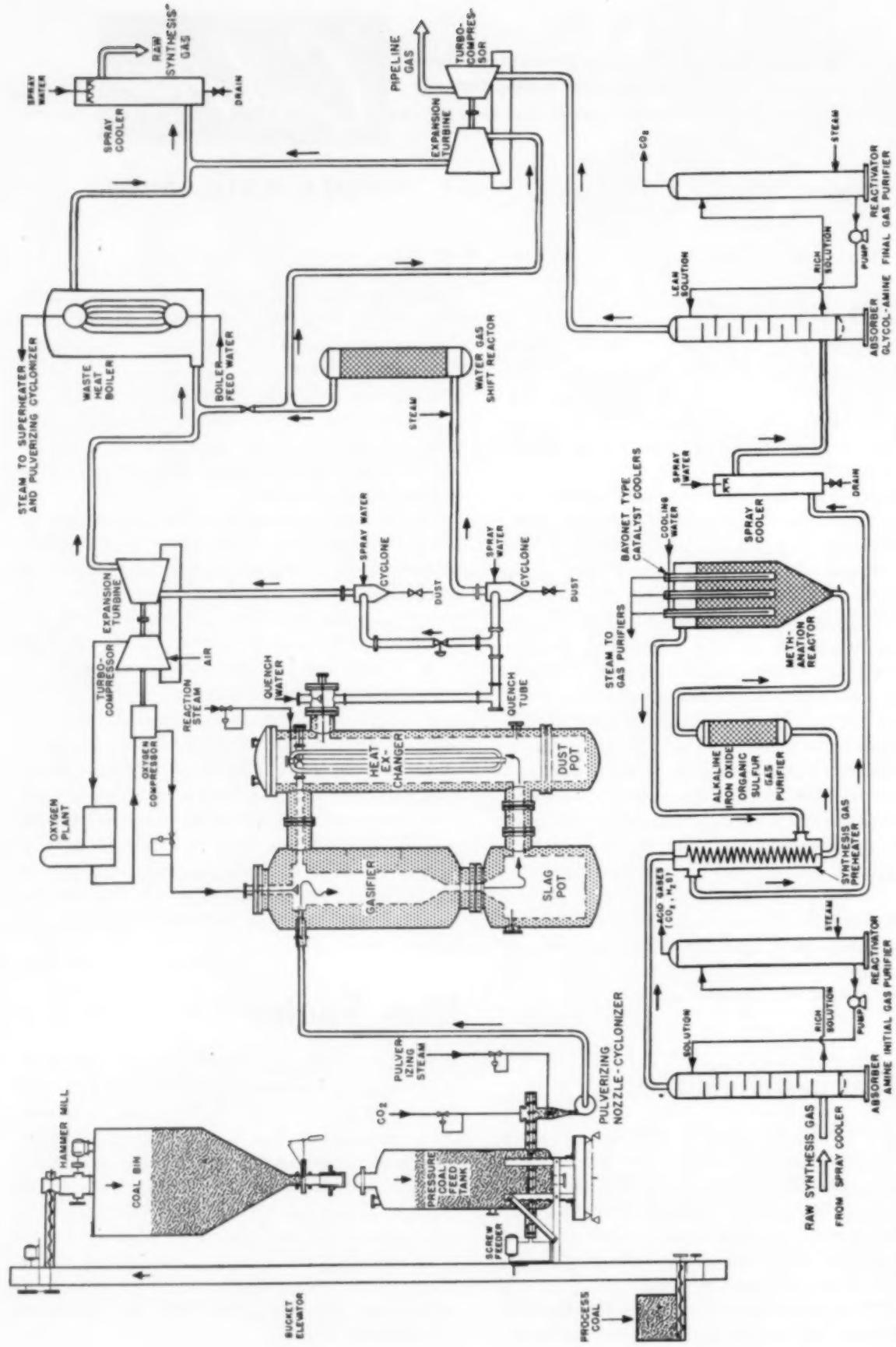
DAY BY DAY, the record in coal mining shows that coal men, now as in the past, have what it takes to achieve progress in the face of difficulties and to build soundly for a better industry. These qualities include ingenuity and determination, and are found in all ranks of management, engineering and operation. At least two cases in point appear in this issue of *Coal Age*. Both involve the development of significant new mining tools: one, the wheel for

more efficient removal of thick overburden in striping, and the other the automatic trip-loading station for underground use. The story of the development of the wheel, in fact, is unusual in its completeness and in the recital of the thinking, the experimentation and the failures preceding final success—and also for the impressive list of collateral developments which coal men can put to use in many other directions.

Increasing determination and ingenuity also are being manifested on many other fronts as the industry works its way out of the last slump in demand. Safety is one, and the new co-operative setup cannot help but save lives and injuries. In Washington, the coal industry is putting up the best fight in its history for fair treatment in a number of critical respects, and is finding a lot of new allies in its programs. And in the market place, where the ultimate decisions are made, coal is backing up undeniable cost and quality advantages with greater sales pressures and improved sales techniques. If, as the record indicates, oil has about reached its competitive peak and gas may be closer to its peak than is commonly thought, one does not have to be a professional optimist to conclude that the immediate and longer-run futures look better and better.

Plus Factor

THE RELATION between forecasts of business developments and action thereon by industries and individuals is the subject of increasing attention. One conclusion is that considerable effort sometimes is expended on getting a realistic appraisal of prospects and then the results are not used. As one financial officer has put it: "We make these forecasts and we reach these conclusions—and we ought to act accordingly in running our businesses." Coal is no exception to the rule that sound forecasting and appropriate action in accord with the conclusions are profitable steps.



GAS FROM COAL—How Institute of Gas Technology proposes to make natural-gas substitutes by pressure gasification and methanation.

COAL

Gas Source of the Future

Future Demand Will Outrun Natural Gas Production Capacity

Coal Is a Major Possible Source of Substitutes

Pressure Hydrogasification Promises Economical Production

By E. S. PETTYJOHN

Vice President and Director, Institute of Gas Technology, Technology Center, Chicago

GAS USE is increasing at a rate that poses a real problem in providing the increments that will be required in both the immediate and distant future. In the main, the supply of natural gas is sufficient to meet the major portion of the Nation's anticipated needs for some little time. However, supplementary sources are required to meet winter peak demands in areas distant from production and storage fields, and additional sources will be required to augment the supply to gas utilities in the future.

Coal, petroleum and natural-gas condensates are logical raw materials for gas production, and the work of the Institute of Gas Technology has been directed to the development of processes for making gas readily available from these substitutes. The last fiscal year of the institute marked the largest research volume in its history, with sponsored research income exceeding \$540,000. Of this total, \$377,000 was received from the PAR (Promotion-Advertising-Research) Fund of the American Gas Association.

Pressure Hydrogasification

Complete conversion of a feed of light hydrocarbons into gas is possible with a process we call pressure hydrogasification. With modifications, the process holds promise of economical gas production from middle distillates and heavy oils.

A part of the pressure hydrogasification work has been sponsored by one of our members, The East Ohio Gas Co., which has spent \$250,000

with us in the last 3 yr. With them, we have developed a thermal cracking unit in which we crack light hydrocarbons—natural gasoline, for example—with hydrogen at pressures above atmospheric. In this process, the light hydrocarbon to be converted is first vaporized and separated into two streams, one of which is catalytically cracked into carbon monoxide and hydrogen over nickel catalyst in alloy steel tubes. The carbon monoxide then is converted into additional hydrogen and carbon dioxide with steam over a water gas shift catalyst and the carbon dioxide is largely removed. This hydrogen is now mixed with the second stream and subjected to hydrogasification by thermal cracking under pressure. As noted, this pressure hydrogasification results in complete conversion of the light hydrocarbon into a natural-gas substitute.

The middle distillates—kerosene, naphtha, and distillate fuel oils—may be similarly converted after separation into a low boiling fraction as a vaporized feed for continuous pressure hydrogasification, plus a heavy bottoms to be used as fuel for underfiring the furnace. A simple flash distillation system now under development is required for this separation. It is anticipated that with the proposed method of operation complete conversion of middle distillate oils will be possible.

The goal we are seeking in the development of pressure hydrogasification is a simple installation that will operate automatically—probably with only one attendant in the plant and producing anywhere from 100,000 to 1,000,000 cu ft of gas per hour completely interchangeable with

natural gas and with no residues for disposal as by-products.

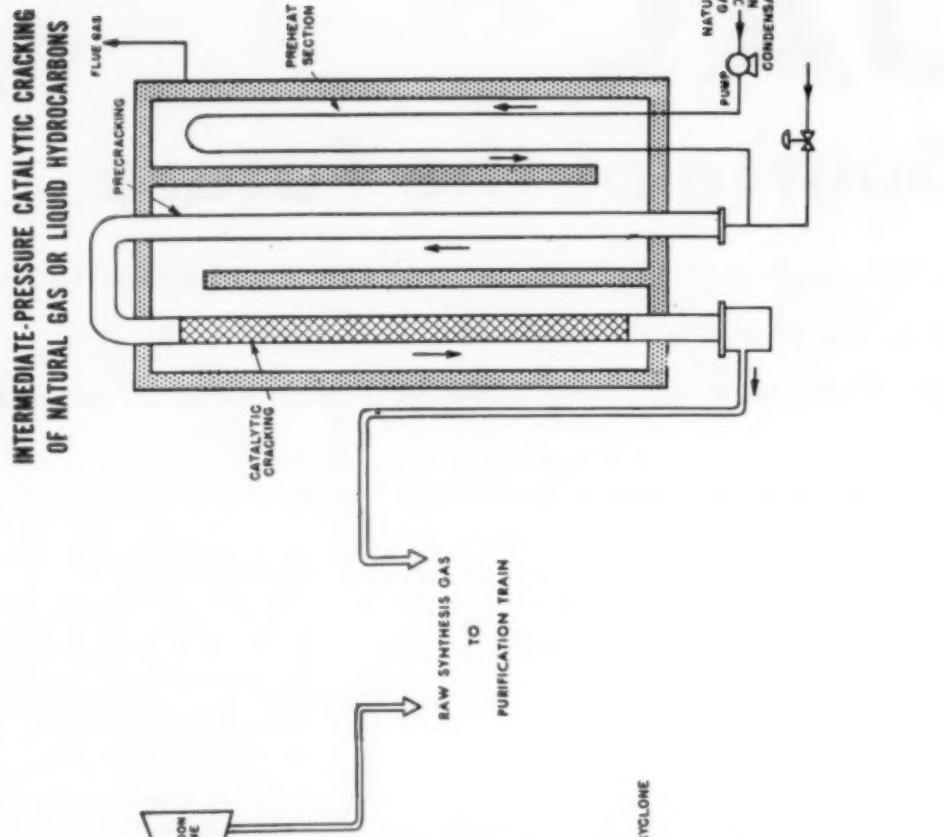
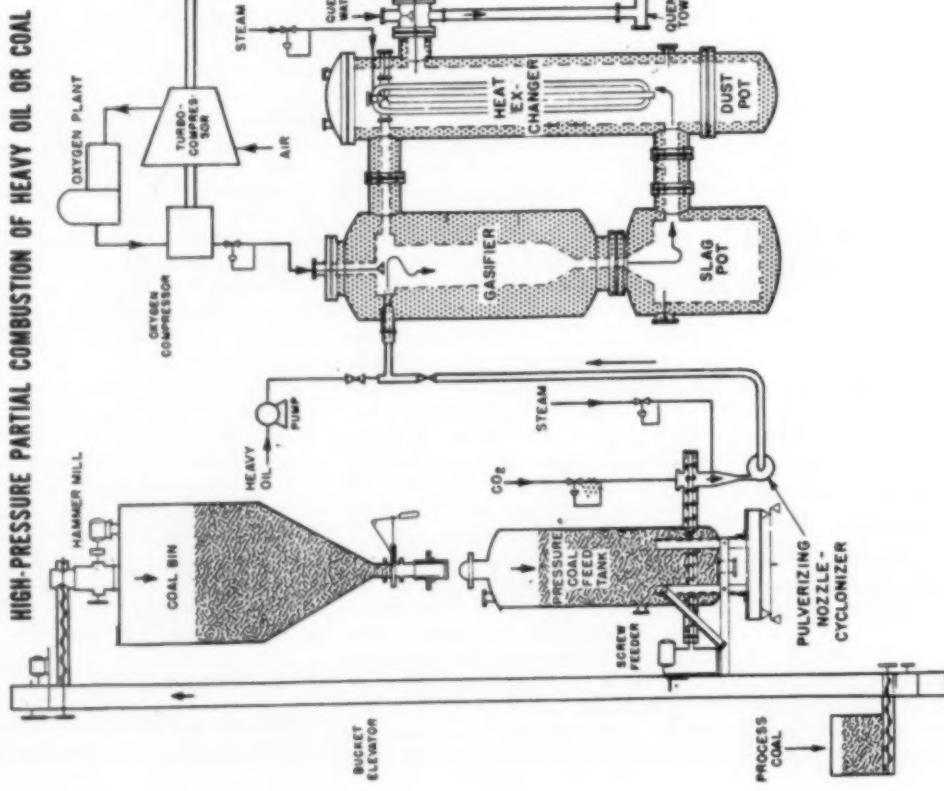
We have accomplished this with natural gasoline, and we believe we can do it with heavier hydrocarbons. This makes relatively low cost, easily stored raw materials available in practically every part of the country, and provides a very simple process for making substitute natural gas. This is of particular interest to the small operator who encounters a high labor cost because of the difficulty of handling solid fuels, and the heavy tar residue of these operations.

At present, high-Btu oil gases are produced at approximately atmospheric pressure. Since they can be substituted for natural gas to only a limited extent, we are investigating the pressure hydrogasification of heavy oils. A pilot plant has been constructed with funds provided by the Gas Operations Research Committee of AGA. Operation is carried out by an automatic cyclic flow timer.

Successful operation of this unit would make substitution of high-Btu oil gas easier, should improve the character of the tar, and should result in a greater yield of gas with a smaller yield of tar. However, the maximum operating pressure of 150 psig will not permit complete gasification of heavy oil, in turn raising the question of minimum pressure and hydrogen quantities for complete conversion. We are at present conducting bench-scale tests of conversion of Bunker C and coal to gas with pressures of the order of 1,000 psi.

Gas From Coal

We are particularly interested in coal because it offers us the largest



HYDROGEN FROM COAL—Pressure production of hydrogen, essential in hydrogasification from coal, natural gas and liquid hydrocarbons.

resource of fossil fuel. Complete conversion of coal to a substitute natural gas will insure an unlimited gas supply for the foreseeable future.

The institute has already developed a process for pressure gasification of coal in suspension without coke, tar or other by-products. Funds were provided by the Gas Production Research Committee as part of the PAR Plan of AGA. The process involves partial combustion of coal to synthesis gas and catalytic upgrading of the gas to methane.

We have recently developed a new approach in which we utilize the pressure and temperature of the gas leaving the reactor, by expanding it through a gas turbine, to meet all the power requirements for oxygen production, and oxygen and gas compression. This eliminates the boiler plant and 13% of the coal requirements, and reduces the capital investment by substituting the gas turbine for heat-exchange equipment.

Steps in the institute's process are shown in the accompanying diagram. In succession, they are: coal preparation, pressure gasification in suspension with oxygen and steam, separation of the ash as slag, superheating of the steam with hot synthesis gases, recovery of the energy necessary for oxygen production and compression by passing the partially cooled synthesis gases through an expansion gas turbine, adjustment of the H₂-CO ratio through water-gas shift, purification of the synthesis gases, catalytic upgrading by methanation over nickel, final purification and dehydration, and compression to pipeline pressures.

There is a difference of opinion as to whether coal should be gasified in fixed beds or in suspension. I prefer the latter method because it is in no way dependent upon the character and quality of the coal or character and quantity of the ash, and does not require preliminary coal processing to accommodate coking or caking coals. Raw-coal fines mined mechanically can be used, as opposed to specially prepared coal mined by hand and machinery.

Hydrogen is a major need in hydrogasification, and in the processing of natural gas, natural-gas condensates and petroleum products, as well as in the production of ammonia for fertilizers and explosives. One of the best sources of hydrogen is coal. Our process for producing hydrogen from coal, including the use of expansion gas turbines, is shown in the accom-

panying flow diagram. The same flow-sheet shows production from liquid hydrocarbons. And since heavy oils can be used in place of coal, we can now make hydrogen from any hydrocarbon from natural gas all the way to coal.

Gas Unlimited

The development of economic coal-conversion processes will not only give us an additional supply of low-cost gas immediately but, since the reserves of coal are many times those of oil and gas, will insure an unlimited gas supply.

It has been estimated that we will reach our peak production of natural gas—around 12 trillion cu ft—in 1960. Our gas requirements have been projected, however, on the assumption that the population in 1960 would be 160,000,000, increasing to 188,000,000 by 1975. However, accelerated growth in the postwar period already has brought us up to 162,500,000 as of July, 1954, and our revised estimate is now 208,000,000 by 1975. Our population growth is running ahead of the time table, but we are not keeping pace in gas production. If the estimated 1960 peak production in natural gas is not substantially exceeded, it will be inadequate and this inadequacy will grow with each succeeding year.

We do not know what the cost of producing added increments of natural gas will be, and we do not know what price level will be required to produce our anticipated needs. We think that the answer to the rising price of natural gas at the distributing company's city gate is the ability to make a substitute gas from available raw materials in sufficient quantity and at a lower cost than pipe-line gas.

If we depend upon regulation for price control, we do not know where this regulation will stop. If we rely on economic competition, however, using our own research instead of depending upon somebody else to do the job for us, we have a real chance of solving this problem of adequate supply at competitive cost. We believe that the road is through the conversion of carbon monoxide and hydrogen into substitute natural gas.

We have been processing synthesis gas, made by the pressure gasification of coal in suspension in our pilot unit at the Crawford Station of The Peoples Gas Light & Coke Co., at a rate of 500 cu ft per hour. That is not very much, but when it is recalled

that we first worked with 1, then 5 and later 20 cu ft per hour, the 500 rate indicates considerable progress.

Next Step

We believe that our developments will bring coal gasification costs to within reasonable distance of present prices for natural gas at the city gate. We now think it highly desirable to build a 1,000-tonnes-per-day coal-conversion demonstration plant to work out the improvements that can be achieved only through practical experience. I urge the co-operation of the coal-producing industry in the construction of this plant.

We believe that the pressure hydrogasification process offers a real opportunity for the small gas-plant operator to cut labor and materials costs and restore the competitive advantage of his product in the market—and these same advantages are available to the larger distributors. For the longer run, we can process coal or heavy fuel oil to gas, depending upon the relative cost and availability of these materials. For example, if a large quantity of Bunker C became available on the Eastern Seaboard, a utility there might want to convert to cyclic pressure hydrogasification. If, on the other hand, it is desirable to develop coal, we can go where the coal is because every transmission line of any size in this country crosses a substantial coal field. Thus, coal can be processed at the mine and immediately delivered to the pipe line for movement to market.

In Illinois and Indiana we can strip mine coal and put it in cars for less than \$3 per ton. We believe we can convert the coal to gas by our process and deliver this gas to the customer's furnace at a lower cost for space heating than by delivery of the raw coal.

The gasification of coal is essentially an operation for augmenting the supply of natural gas. The gasification of oil is primarily one of supplementing the natural-gas supply to meet winter peak loads in localities where the supply of flowing gas is inadequate and underground storage is not available.

The development of these processes for the conversion of coal and oil to natural-gas substitutes will insure the Nation of an adequate gas supply for the next 150 to 200 yr at least.



TWIN GOALS IN WHEEL DEVELOPMENT were efficient reduction of high banks and low-cost long-range spoil disposal. In this profile of the Buckheart machine, second of three Kolbe units, the wheel and ladder conveyor are at the left, with the stacker conveyor projecting to the right.

Developing the Wheel For American Coal Stripping

The story behind the evolution of an idea for cutting the cost of stripping in high banks into a new machine that handles dirt two to three times faster than conventional units of the same size and cost

By FRANK F. KOLBE, President,
United Electric Coal Cos., Chicago

WHAT COAL STRIPPING NEEDS is a more economical method of moving dirt. That is the only conclusion we can reach when we look at how thin-cover reserves are being used up, confronting most companies with the job of taking off 50 to 80 ft of material to maintain their production. We, too, began to meet up with this problem several years ago, and were impelled into a search for a stripping unit that would cost less to build and operate per unit of capacity.

The search started in February, 1943, and soon led us to the wheel excavator. The first unit was completed in August, 1944. That was only the beginning, however. It is only now,

over 10 yr later, with the third machine just getting into operation, that we can say we have solved most of the problems and have arrived at a machine that will handle dirt two to three times faster than conventional equipment of the same size and cost.

The need for a more economical stripping unit grows out of the fact that with conventional equipment the height of overburden, in turn determining quantity to be handled, sets very definite limits on the profitability of strip mining. In Illinois, where the coal thickness usually is 4 ft or more, strip mining has been very profitable in less than 40 ft of overburden, reasonably profitable in 50 ft, and indifferent in results above 60 ft. Putting it another way, the good thing about coal stripping is that it has been cheaper to strip than go underground; the bad thing, that it isn't enough

cheaper, particularly today. There just is not enough 40-ft overburden, and most of what there was has been mined.

Aside from costs, another trouble with strip mining has been uneven output, largely a result of uneven stripping depths. Loaders, trucks, washing plants and mine organizations are geared to capacity operation. When overburden thickens, moving the same quantity of dirt does not uncover the same coal tonnage. Also, more frequent breakdowns and the lower rate of handling spoil resulting from operation at extreme range cuts yardage per hour and hikes the cost still more.

SETTING THE GOALS

The need for a new method of moving dirt in coal stripping, and particularly in 50 to 80 ft of material, arises from the fact that past methods

have operated to give us results the exact opposite of what we want.

As overburden ratios increase, the machines should become more efficient per yard moved, thus keeping the cost per ton of coal stripped low. Instead, cost per yard increases and there are more yards to move. The result is that cost per ton of coal stripped increases geometrically. One reason is that boom lengths must be increased, with consequent decrease in bucket size. Also, the swing must be increased from 90 to 180 deg, increasing the time per cycle. You move less per cycle and have fewer cycles per hour. Repairs go up, and often, in moving thick overburden, some of it must be rehandled, either by the original stripping machine or an auxiliary booster.

We had three goals in our investigation of possible new stripping methods and techniques:

1. To handle overburden up to 85 ft and place the spoil far enough back to avoid slides.

2. To cut costs per cubic yard below those possible with any present machine of equal size.

3. To leave any overburden not moved by the new machine so low in height that the efficiency of the accompanying shovel or dragline would be increased.

SEVEN UNITS STUDIED

Because the matter of cutting stripping cost was so important to us, we investigated all methods—even the most improbable.

1. By Shovel—With a large shovel costing \$1,500,000 erected, it is possible to move 1,000,000 cu yd per month at a cost of \$20,000 for operating and maintenance charges. With a standard-sized bucket, such a shovel—by itself—can handle up to 60 ft of overburden—and a little more on an outside curve. Beyond that, yardage per hour goes down because of the need for more careful placing of material and longer swing, and the hours worked also go down because of more frequent shutdowns for maintenance.

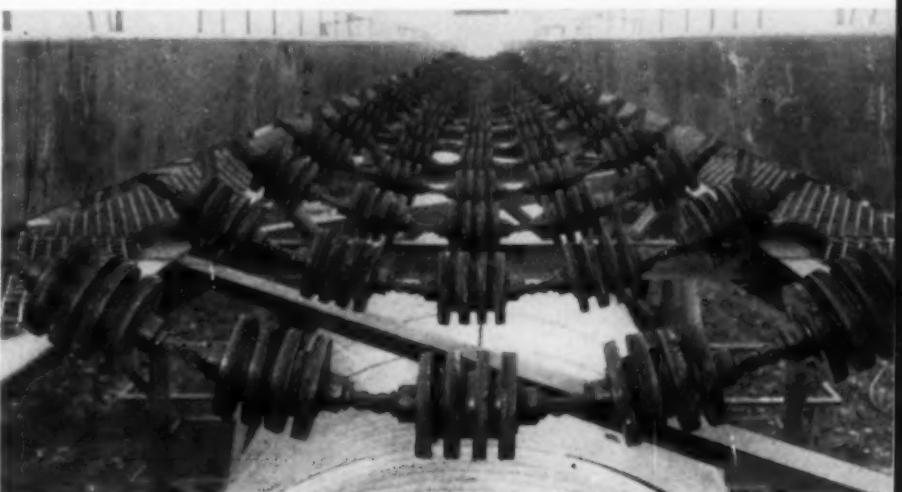
2. By Walking Dragline—Walking draglines are more flexible than shovels, but per hour they do not move as much material as a shovel of equal weight and cost, and power costs are higher. Operating experience indicates that a 25-yd dragline can move 650,000 yd a month in 55 ft of overburden, and that a 30-yd machine can move 700,000 yd a month in 70 ft.

3. By Hydraulicking—Only one attempt has been made to hydraulic, and it was abandoned because of high costs.

4. By Throwing Spoil Across the Pit—A machine for this purpose would



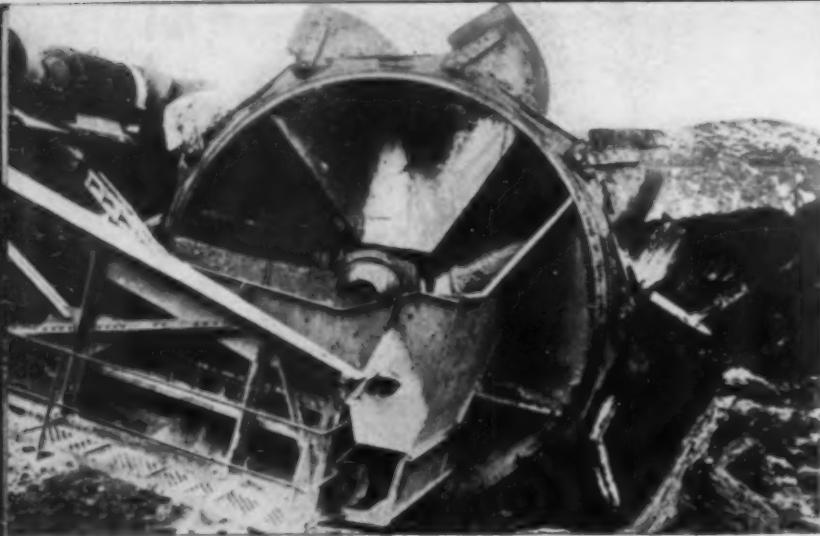
DIGGING WHEEL LATEST-DESIGN 22-ft wheel (patents applied for) has a capacity of 16 cu yd per revolution and has run up to 10 rpm. Chain backing and "windshield-wiper" cutters prevent material buildup.



TOUGH IDLERS VARIED PROBLEMS of high-speed handling of materials, including rocks up to 1½ tons, led to developing the Huey-Stamos idlers (patents applied for) shown on the stacker for the Fidelity-mine wheel.

WHEEL RESULTS FINAL PAY-OFF for development work on Kolbe wheel is a top benched efficiently and at lower cost, with chances of slides minimized and overburden reduced for better shovel performance on final pass.





WHEEL EVOLUTION

GERMAN WHEEL, upper left, is contrasted with original Cuba wheel, right, and modified wheel with heated buckets, lower left. The latest wheel now in use at Cuba mine (patents applied for), featuring chain backs in buckets for positive material discharge is shown at the lower right.



be similar to a rotary snow plow. Some are now in use for ditching and terracing land. One manufacturer once started to build such a machine for coal stripping but soon stopped. We felt that our distances and heights were too great for this method to succeed.

5. By Car Transporter—One such machine has been built and operated, with some but not outstanding success. No others have been built for coal stripping.

6. By Tower Excavator—Compared to the dragline, this unit offered no advantages except for a longer reach, and this reach would be secured at the cost of lower mobility and longer cycle time.

7. By Belt Conveyor—Of all the methods of moving high overburden to the spoil, the belt conveyor appeared the most feasible for our purpose. Conveying by belt is a standard process, though not as standard as we first thought, and is low cost where there

is volume. Volume, of course, is one thing we do have.

The material we would be moving would be largely dirt and shale, which are ideal for a belt, but occasionally we would be encountering rocks up to $1\frac{1}{2}$ tons. And frost lumps also would be a problem, since our ground freezes 2 or 3 ft deep and breaks up into pieces up to 4 ft square. However, we felt that almost anything could be carried on a belt if the idlers were strong enough and close enough together, if the material could be put on the belt without impact, and if—the big if this time—the engineering was right.

DIGGING FOR A BELT

Having decided on a belt to convey the material, the next problem was how to dig it and put it on.

Here again we investigated all methods—probable and improbable. The fall into two general classifications; intermittent diggers, such as,

shovels, draglines and hoes, and continuous diggers, such as, wheels, bucket chains, bulldozers and plows.

Intermittent machines, in normal use, suffer from the disadvantage of digging the material in large masses, requiring the use of a hopper for uniform feeding to the belt. A hopper to handle masses of material of the size we are talking about would be bigger than a shovel dipper and, with its feeder, would be very heavy. In muddy clay, it would be subject to clogging. If you are going to move material in uniform small quantities, it is better to have it that way from the beginning: i.e., the digger should dig in small quantities. That way, it also operates as a feeder.

Another shovel or dragline disadvantage is slow digging speed, which varies from 150 to 200 fpm, or a little less than 2 mph. This does not compare with the rates established by other dirt movers. Plows operate very well at 6 mph, or 500 fpm, and manufacturers say this is not the limit. A

farm tractor will dig an acre, or 43,560 sq ft, in an hour. If the cut is 6 in deep, this is 21,780 cu ft, or 800 cu yd, per hour—this by a machine costing around \$2,000. To get this capacity in a shovel or dragline would cost several *hundred* thousand. We were not able to figure out how to use the conventional plow, but its characteristics of continuous, uniform operation, at high speed, stayed with us.

WHEEL THE ANSWER

The way to dig continuously is to mount your cutting edges on some continuously operating unit: a tractor, a bucket chain or a wheel.

We decided against the bucket chain because of its relatively low operating speed and also because of its many parts, leading to increased maintenance and consequent high cost and down time. Except for the axle bearings, a wheel has no moving parts, since it is all one piece. The power consumption of a wheel is materially less than a bucket chain. Also, a wheel weighs only two-thirds or less of a bucket chain of equal capacity, with costs down somewhat in proportion. And a wheel can be run faster—up to a peripheral speed of 600 fpm or more, compared to 200 fpm or less for a bucket chain.

Having decided on a wheel, the next thing was, "What type?" There were many possibilities, but we finally decided on a wheel with buckets and side discharge, although we are still working on others.

After we got into continuous digging and disposal, we found that the Germans had done considerable work along this line. Up to 1936, they had built over 722 such machines—22 wheel and 700 bucket chain. Their first wheel 25 yr ago was a failure. Improvements since that time have resulted in a trend toward wheels and away from bucket chains.

The last and largest German wheel is 39 ft in diameter and the weight of the machine is 10,600 tons. If built in America today, the cost would be \$7 to \$10 million. However, their wheels would not give us what we wanted because of less efficient dirt discharge, which limits operation to only 3 or 4 rpm, with resultant low peripheral speeds. They did not provide plow speeds, and that was what we were determined to have.

DESIGNING THE MACHINE

To cover the entire surface with our digger, the wheel must be swung in an arc. It also has to be raised and lowered, and must be capable of being pushed out and pulled back.

Pullback, or retraction, was accom-

plished very simply by adopting the principle of the extension ladder. In other words, the conveyor is in two sections, one sliding on the other, with a bearing at the connection to make it possible to raise and lower the wheel. From a mechanical point of view, the extension-ladder principle had many advantages:

1. **Maximum simplicity.** In stripping where large quantities of material including sticky clay, roots, large frost lumps and rocks must be moved and where the machine must operate 24 hr a day the year around in all sorts of weather, simplicity is essential.

2. **Straight-line dirt travel.** This makes it easier to transfer the dirt from the ladder belt to the stacker belt.

3. **Lower cost—a result of simplicity.**

4. **Live instead of dead weight.** Our wheel and ladder replace the conventional boom and dipper, while the stacker replaces the ballast. On our dragline, the ballast totaled 100 tons, all dead load. On the wheel, the stacker and ladder act as ballast for each other, and all the load is useful load. That is why we could build so much machine on so small a base, and it was this that really decided us for this design.

5. **Mutual support.** The two gantries, one supporting the wheel ladder and the other the stacker, can be made to support each other. This materially reduces the strains on the structural members of the revolving frame.

We looked into the possibility of separate swings for the ladder and stacker, but the gain in added flexibility was small and we would have had in effect two machines, each weighing, with ballast, as much as our present wheel. Consequently, the base would have to be twice as big or, with the same size of base, output would be cut in half.

We started investigating all methods of handling overburden in February, 1943. By March, we had arrived at a general idea of what we wanted, and in June we signed a construction contract. At about the same time, I applied for a patent. In August, 1944, the machine was completed—a very short time.

PROBLEMS WITH CONVEYORS

Initial wheel operation, at our Cuba mine, showed us that we still had a number of problems to solve, including some we thought had been taken care of many years ago—for example, the problem of designing belt conveyors to work under wheel conditions.

Even before we got into the belt

problems, however, we had the problem of getting yellow clay out of the wheel and onto the belt. The wheel was mounted alongside the conveyor, and it was thought if it dropped the dirt onto a slope sheet inclined 60 deg, the dirt would slide a distance of 1 ft over to the conveyor. Most of it did, but some stuck, forming a dike that prevented any flow. We polished the slide. No help. Stainless steel was no better. We tried an electric vibrator, which merely packed the dirt. In the course of our experiments, we found that yellow clay would even stick to the underside of a stainless-steel sheet under heavy vibration.

So we found we couldn't use a chute. The answer was putting an 18-in roller alongside the wheel between it and the belt in place of the inclined sheet and letting the roller spin the material onto the belt. By scraping the roller, dirt buildup was prevented.

In conveying, these were the problems we had to solve:

1. How to get both clay and 1½-ton rocks from one belt to another.

2. Handling wet material in zero weather.

3. Preventing rocks from bouncing and rolling backwards.

4. Attaining twice the usual belt speeds.

5. How to keep belts running true to prevent side cutting in difficult situations.

6. How much material can be loaded on a foot of belt.

7. How to design idlers to take the punishment involved in wheel operation.

8. Where to put the stacker drive.

We never expected to have even one of these problems—the conveyor business being an old business—and it gave us a bit of a jolt to have them all dumped on us at once.

EASING THE TRANSFER

With our size of rocks, handled together with sticky clay, there was no stock solution to the problem of transferring from one belt to another, and we had to develop our own.

The conventional means of driving a belt of the width and thickness we were using is through a 3- or 4-ft head pulley high enough above the second belt so that the return of the top belt will not rub the carrying strand of the bottom belt. That is good, conventional engineering, working out, in our case, to 11 ft. But you can't drop large rocks even 3 to 4 ft—the usual pulley size—without trouble ensuing, and we were propelling 1½-ton rocks 450 fpm and then dropping them 8 to 11 ft. The im-

pact was equivalent to crashing a Chevrolet at 25 mph, and the wonder is not that we knocked out the idlers but that the rocks did not go through the steel frame under the belt.

To overcome this trouble, we first put in an auxiliary belt to carry the material down more gradually, with no success. Then we put in a bed of 8-in steel rollers, but the brass bearings quickly wore out. Finally, Charles Sosey, Cuba master mechanic, suggested roller bearings. From that time on we had no bearing trouble, and I might comment that it is wonderful what a ball or roller bearing will stand.

The ladder dump, however, was so high that we sometimes overshot the rollers. What we needed was a much smaller head pulley down closer to the second belt. But how small a head pulley can you use with a heavy belt? The established standard is 3 or 4 ft. But we found out that that was just another idea. A dirt-loader manufacturer has been using an 18-in head pulley and a 7-in tail pulley for years. Such sizes make the belt manufacturers squirm, but the loader manufacturer told us they have not had any belt trouble, and we haven't either. The belts are better than the manufacturers realize.

So we went to a smaller head pulley down close to the second belt. To do it, however, we had to throw away all the structural steel on the front of the machine and build a new ladder.

CHECKMATING ICE

A second early question in wheel operation was: "How do you run a belt in subzero weather when the material freezes on it several inches deep?"

Freezing was something we hadn't counted on at all, and we had to shut down. We couldn't find anyone who had any answer, except for the operator of one sand pit who sprayed the belt with water, which froze and then cracked off as it went over. Even if we had had that much water, we wouldn't have wanted to put it in the spoil pile, which is already unstable enough without making it more fluid.

The Germans, though, had evolved the practice of a canvas covering over the belt. Involved piping and a big wind resistance are disadvantages. Also, there is a fire hazard. However, it seemed the only way until our chief chemist, Lowell Malan, suggested infra-red lights beneath the belt. A belt retains heat well and lights at one point would supply enough to keep the belt warm all the way around.

In the meantime, however, for other reasons I will bring out later,

we speeded the belt up to 650 fpm. This eliminated freezing, and is another example of the things we had to get into and the solutions we had to work out.

SPEEDING UP THE BELT

Size and weight considerations required us to keep the width of the belt as low as possible, which in turn brought us up against the question—another one where we assumed that full data had been developed years ago—of how fast can a belt be run.

Belts ordinarily are installed where the problems of foundation and support are not critical. Therefore, if one wants to move more dirt than can be carried on a 48-in belt going 450 fpm, put in a 60- or 72-in belt. But a wider belt means more weight and we could not afford to impose more weight on the lower frame. Also, when our belt is full, the weight of the material is 15 tons. If we wanted to carry twice the dirt at the same speed, the weight would jump to 30 tons, or more than we could support.

Our problem was almost the reverse of the usual problem in belt design, which is the longest belt life with the lowest cost per yard of belt and conveyor. We needed something that would give us the greatest output from a million-dollar machine—at the lowest over-all cost. Our belt and idlers are worth about \$45,000. The remainder of the machine might represent an investment of \$1 million. We had to design with the idea of getting the most out of the million, not the \$45,000.

Lowest over-all cost involved running the belt at speeds beyond that acceptable when considering only the effect on the belt. So far as I know, there is no U. S. belt installation operating at over 500 fpm, though the handbooks show speeds up to 750. Our first step was to go up to 650 fpm, and we wanted to go much beyond, but hesitated in the face of unanimous adverse opinion. Fortunately, at that moment, we obtained data on the latest German experience. Faced with the same problems on their excavating machines, they had raised their belt speeds up to 1,000 fpm, and reported that the belts could take it.

How fast you can run a belt is a matter of uncertainty. However, you can run tires, which are really circular belts, at 60 mph, or 5,000 fpm, for long period of time. The limiting factor on belts might well be that of getting the material traveling at the same speed and in the same direction when it hits, and not the actual speed of the belt itself.

Another thing we didn't know was

how much of our kind of dirt you can put on a foot of belt. This can be determined only by experience, and depends on the way the material is delivered to the belt and the kind of material it is. We found that if you can maintain even loading, a 48-in belt will carry 300 cu yd per hr for each 100 fpm of belt speed. Therefore, when you get up to 1,000 fpm, you can carry some pretty good yardages.

DEVELOPING IDLERS

Unusual loads and shocks in belt operation required on-the-job development of special idlers.

Standard products for standard uses again failed to measure up when it came to picking idlers for our belts. Breakage was the problem, and the first reaction was to build heavier and stronger. This is sound, but increases weight and cost, whereas the real solution is analyzing strains and then trying to avoid them, or, if this is not possible, building to handle them a different way. What are the strains idlers must stand?

1. Supporting the weight of the belt and load. The conventional idler uses the beam principle for support. We support through tension: i.e., by using a chain or wire instead of a beam.

2. Resisting the impact of rocks dumped on the belt. We reduce this strain by letting the idler move with the flow.

3. Resisting the bumping each idler gets as a rock is carried along on the belt. As with dumping, the answer is letting the idler move with the flow.

The idler design that takes care of these strains was originated by J. J. Huey and Chris Stamos, of our engineering organization. Different from any other, the idler (patents applied for) consists of small rollers approximately 6 in wide fastened together by pieces of roller chain. Boat hooks at the ends are slipped around pipe, and the idler hangs in a catenary curve. The advantages are many.

1. The idler rocks with the blow.

2. The idler weighs only 100 lb, whereas a conventional idler heavy enough for the job weighs 300 lb.

3. The cost is less.

4. Two men can change the idler in a minimum of time, whereas changing a 300-lb unit is quite a job.

5. The belt tracks much better. With conventional equipment, only the side idlers help in tracking the belt, and most of the weight is on the center idlers, which provide no tracking force. With our idler, four out of five rollers help with the tracking. When we install only a few of our suspension idlers at the end of a

stacker, it is an interesting sight when the belt, which was away off on the conventional idlers, comes to the center of the suspension units.

6. The shape of the catenary curve can be adjusted by nuts at each end of the idler to make a smooth path for the belt.

7. The combination of a smoother belt path and the fact that the idlers yield to rocks and lumps makes the material ride more smoothly and keeps rocks from bouncing and rolling back.

8. The supporting structure is very simple, consisting only of two pipes—one along each side—over which the idlers are hooked.

9. The space under the idler is open. There is nothing for dirt to build on.

10. Contact between belt and idler is much improved. This, together with the fact that there is no place for dirt to accumulate and build up friction against the rollers, lets all the rollers turn. In conventional belt installations in dirty locations, 10% or more of the idlers usually are frozen.

One further thing we had to find out was where to put the belt drive. On our first installation, it was at the head of the stacker, but the weight away out there was a big disadvantage. At the tail end, it slipped too much. Finally, we put it part way up the stacker.

WHEEL PROBLEMS

Compared to some of the things we ran into in designing the wheel, the belt problems were hardly problems at all.

Before going on to these problems, however, there is the problem of how any wheel can be run in material in which rocks are embedded. The wheel looks and is big. It weighs 30 tons but travels relatively slowly. But it is a real shock when it hits a rock and stops right now. However, it is the motor, small compared to the wheel, that is the killer.

The motor armature is 3 ft in diameter, weighs 1½ tons, and the stored energy when it is traveling 60 to 90 mph and is stopped instantly snaps 8-in shafts, tears out bearing held by four 1½-in bolts, slides gear teeth past each other or tears them out, and bends heavy I-beams. It speaks a great deal for the strength of the machine that it could stand up under such shocks.

We have helped our problem by employing the clutch—but with a difference. With the usual clutch, if it slips much, the operator screws it up tight. Then you have a worse condition than before—not only no clutch but an added flywheel. We were

strongly advised to have nothing to do with clutches but the machine wouldn't hold together without one. What we had to get was a clutch the operator could tighten temporarily but not permanently.

After looking into all types of clutches, we decided on the Fawick, which tightens by air. To give the operator the control he needed, we put the control valve in his cab. If temporary tightening is required, all the operator has to do is turn a valve. When the need is over, he releases it. On our Buckheart wheel, we now are using hydraulic couplings, which are more satisfactory but have a limited speed range. The Germans use a special hydraulic release instead of either clutches or couplings.

Bearings—The first wheel had bronze bearings, which we changed to roller bearings as soon as we could. Meantime, we had to carry on with the plain type, adding improvised thrust washers. This leads me to observe once again that unless one is extremely certain, one should use ball or roller bearings.

Drive—One of the things that gave us endless trouble was the wheel drive. Since the success of the wheel depended upon a good drive, we followed our usual practice and investigated every possible kind of gear—planetary, epicycle, external and internal. Today, we have a clutch or hydraulic coupling, a standard gear reducer, and an internal gear. Originally, all we had was a system of open gearing and a bevel ring gear welded to the wheel. The side thrust generated in the bevel gear was beyond what our beams and bearings would stand. So we had to devise a new system.

Maintenance of alignment on our wheel drive was another thing we gave a lot of attention to. We have never had trouble with misalignment with our m-g sets. This is because everything is mounted on one base, which is not subjected to structural or digging loads and the deformatory forces resulting therefrom. That was what we wanted on our wheel but again we had to go through a process of evolution.

Originally, the motor and speed reducer were mounted on the ladder, with the ring gear on the wheel, in turn mounted on the axle. If the ladder twisted or the wheel hit a rock and the axle was deflected, our gears were out of alignment. This was one of our biggest headaches. Now, we mount the wheel, and therefore the ring gear, on a tube, with the motor and reducer on a base also mounted on the tube. Tube and base are very rigid. Then, the tube rests on the axle. It takes none of the structural

loads. It is merely a base for the wheel and the machinery support.

BUILDING WHEEL AND BUCKETS

Although the over-all design of a wheel mounted on a ladder, with the ladder belt dumping onto a stacker extending out 250 ft, was a considerable problem; although we had to devote a great deal of thought to our belt-conveyor system, resulting in a new idler design; and although our wheel drive gave us some difficulty, our big problem was the wheel itself. This was the digging end and the heart of our machine.

The first wheel built for us had a series of shovel buckets mounted around the rim. Oddly—or perhaps not so oddly—the wheel was almost a replica of the sagua, the Egyptian water wheel, 5,000 or more years old, the big difference being that the sagua has pottery jars around the rim.

In our wheel, the dirt had to be pushed out from the backs of the buckets through the fronts, which were the only wholly open sides. The first change was to a dragline rather than a shovel style, with the bucket fully open on two sides, and about half of one of the other sides. As digging started at the bottom of the cut, the dirt went in as in a dragline bucket, except that we dug more along the sides and less along the front. At the top of the wheel, the bucket was turned over with one of the open sides down to discharge the material.

CLEANING THE BUCKETS

Dirt buildup in the buckets was one of our first problems.

We have, perhaps, moved more dirt than any other coal-stripping company, but none of us was prepared for the way the material built up in the buckets. If, out of a cubic yard, only 0.10 in remains in the bucket, at 3 rpm that would be 0.3 in a minute or 3 in in 10 min. We tried lining the buckets with stainless steel, and experimented with many other methods of preventing dirt buildup.

At first, however, we were reduced to shutting down and cleaning the wheel by hand. This took 2 to 3 hr per day, or 50 to 70 hr per month—a substantial bite out of our possible operating time. We found that dirt sticks less to a hot surface, so we heated the buckets to the point where they were unbearable to the hand. We also tried to develop cleaners that would go into the buckets. Some were like hoes, others had revolving brushes, and others had revolving cutters like a lawn mower, but none of

them functioned to our satisfaction.

The final solution was to make the back of the bucket a mat of chains. In this position, the chains form the outside segment of a circle which changes its form twice each revolution. This motion cleans the chains and also helps discharge the material. We were told we would never whip this material buildup. The trenching machine manufacturers have not, but we did. Based on my experience with the wheel, I would say that when anyone claims something can't be done, he is saying he can't do it.

INCREASING WHEEL CAPACITY

The capacity of our first wheel was 160,000 yd per month—away under what we had to have. We had to increase output without increasing weight—a nice problem.

Capacity of the first wheel was 5 cu yd loose measure, or 3.75 bank measure, per revolution, and the speed was 3 rpm, giving us, theoretically, 11.25 cu yd per min. We found, however, that we had to deduct about 50% because of time lost at the ends of swings and to uneven filling of buckets. Therefore, actual capacity was only a little over 300 cu yd per hr, or 160,000 per mo. This was no good. We had to have more, which meant a larger-capacity wheel and a wheel that had to run faster—this without any increase in wheel diameter and weight, since we already were at the limit with the revolving and under frames we could use.

The first thing we did to increase capacity was to cut out the side of the bucket toward the center of the wheel, using a plug to keep the dirt in until we wanted it out. This changed the bucket from a shovel to a dragline style, and let the buckets spill their dirt within their own area instead of through space between buckets. Thus, we were able to put the buckets closer together and get additional capacity on the wheel. Also, we made the buckets deeper, and finally we found out how to make them wider. The wheel, designed on the German ideas, had a capacity of 5 cu yd. Our design has three times this capacity, and weighs no more.

RAISING WHEEL SPEED

An obvious method of increasing wheel capacity without increasing weight was higher speed, again a considerable undertaking.

The Germans, after working 25 yr, had gotten their wheels up to only 3 to 4 rpm because, with their design, the dirt is carried over at higher speeds. This is not because of periph-

eral speed but because it takes the dirt longer to slide out of the wheel onto the belt.

With a shovel or dragline, speed apparently is limited to 150 to 200 fpm in digging. A plow, however, can operate at 6 mph (500 fpm) or more, and our goal was plow speeds with a 20-ft wheel, which meant getting speeds of 6 to 10 rpm—something the Germans had not accomplished in 25 yr. The only way the Germans knew to increase peripheral digging speed was to increase the size of the wheel. In 1943, they installed a 39-ft wheel with a peripheral speed of 346 fpm. To get 500 fpm, which we wanted on a 20-ft wheel, a 50-ft wheel would be necessary. The weight would be intolerable and the extra expense of not only the wheel but its supporting members would be out of the question.

Bucket-to-Belt Transfer—A considerable part of the answer to the problem of speeding up the wheel lay in the method of getting the dirt from the wheel buckets to the belt. Something must be put under the buckets to receive the dirt as it falls out and move it sideways to the belt.

The Germans welded chutes into their wheels. Usually, the end of each bucket ended in a chute, and chute and bucket were really one piece. This had the serious disadvantage that the material must fall out of the bucket and travel along the moving chute out of the wheel before it is carried over. As a result of slowing down the wheel to give the material time to slide out of the chutes, speed was limited to 3 to 4 rpm.

Another major disadvantage of this kind of chute is the fact that it is several feet long and the dirt must not only slide vertically down it, but also dirt on the far sides of the buckets must be moved over 3 to 4 ft horizontally at the same time. This sort of wheel will not work in our kind of dirt. It will work at relatively low efficiency in shale or gravel.

Our first solution was a fixed chute in the wheel underneath the buckets. This chute was not carried around with the wheel, and therefore would not carry around material. In other words, as soon as the material was out of the bucket, it was free of the revolving part of the wheel. Therefore, dumping time could be cut half or more. Another big advantage of this fixed chute was adaptability to cleaner installations, though it was a long time before we got a satisfactory one.

Cleaning the Slope Sheet—The slope sheet is roughly rectangular, so we tried moving a grill back and forth across it. Operation was hydraulic and we had trouble with everything. The worst was in the back-and-forth cut-

ting action. If the blades were set to cut like a chisel one way, they plastered the dirt on the reverse stroke. They had to be wide at the top or bottom for strength; if at the top, the cutting angle was wrong; at the bottom, the dirt built up underneath.

The way we finally hit upon involved no pump, valves, reciprocating motion, or blades working in two directions. We mounted an electric motor and gear reducer on the reverse side of the slope sheet. The shaft was put through the center of the sheet, and on this shaft we mounted a cutter. It was like a windshield wiper except that the center mounting permitted it to turn all the way around—in other words, to revolve. The blade could be set at the right angle and it always turns in the same direction. Since the shaft is in the middle of the sheet, the arm is relatively short.

Capacity Tripled—The final result of the preceding and other measures is that we have a wheel with a capacity of 16 cu yd per revolution, loose material; that has run at 10 rpm; and that is automatically cleaned. The latest German wheel (1943) is 39.37 ft in diameter, with 10 2/4-cu yd buckets (loose measure), and operates at 2.8 rpm. Capacity is 75 cu yd per min, loose measure. At 10 rpm, our wheel has a capacity of 160 cu yd per min. Our 22-ft wheel will move twice the material the 39.37-ft German wheel can handle. Size for size, our wheel will outperform the German wheel four times.

STRIPPING WITH THE WHEEL

Our wheels operate in tandem with shovels. The wheels take off the top of the overburden, and the shovels the bottom.

There are several reasons for tandem operation. First, we had the shovels, though they did not have the reach necessary for our bank height. Therefore, we added a machine that could work at these heights. Second, there is a band of hard rock above the coal, and boulders in the higher overburden. A shovel is the way to move layers of rock and boulders above a certain size.

With the wheel-shovel combination, there is little interference between the two machines. Also, the wheel does not interfere with haulage trucks. Consequently, we do not compound trouble in the pit.

We advance our retract with each swing, keeping the center of the circle in the same place and giving us an even depth of cut horizontally. It has been suggested that we employ a retract in which the center of the swing would be advanced. The cut, however, would feather out, and part

of the time the buckets would be full and part not, unless compensated for by an elaborate electrical control system. If not compensated for, present efficiency would be cut one-third.

In high overburden, it is necessary to spoil far back, first, because for every foot you go up in spoil height you have to go back an additional $1\frac{1}{4}$ ft to reach the angle of repose. With an 80-ft bank, spoil height is 100 ft, and it has to be 125 ft away from the edge of the coal. Actually, the dirt should be put back even farther because, if the spoil gets full of water, the angle of repose is even flatter. Also, the additional weight of dirt in a high pile forces dirt out at the bottom.

The stacker on the Buckheart wheel extends out 225 ft horizontally from the center of the machine, and the dirt is thrown another 25 to 30 ft by the speed of the belt, making the total dirt travel from the center of the machine 250 ft. The center of the machine is 45 ft in from the spoil edge of the coal berm. Therefore, when the stacker is perpendicular to the pit, the dirt is thrown 205 ft out from the edge of the coal berm.

In 80 ft of bank, the spoil would be 100 ft high and would come 125 ft over toward the edge of the coal berm. This would still leave 80 ft between the berm edge and the base of the pile for disposal of shovel spoil. To place all the wheel spoil the maximum distance from the edge of the coal berm, moveups should be limited to 60 ft. There is relatively little overburden over 65 ft at Buckheart. Consequently, we can bring the spoil in farther than if we had 80 ft, thereby lengthening moveups.

In addition to putting the dirt far back, the wheel also spoils it in an even stream instead of dropping it in big gobs of 40 to 50 tons. These 40- to 50-ton hammer blows start material sliding that otherwise would remain in position. We formerly had many slides at Cuba, but have had none since we installed the wheel even though we have been moving 100 ft of overburden. Also, the high-wall is left with a bench, eliminating slides into the pit.

Putting the dirt really far back with the wheel has two other important benefits. First, it provides the shovel with so much spoil room that care in placing is unnecessary and the operator can let it go on the fly. Second, the shovel spoil is kept well back from the edge of the coal berm and all the coal can be recovered. No rib is ever left.

WHEEL PRODUCTION

The Buckheart wheel excavator has

been producing at a rate of 1,700 cu yd per hour.

The 12-cu yd 170-ft-boom dragline on which the wheel excavator was built moved 400 cu yd per hr. The latest model 25-cu yd dragline will move 1,100 cu yd per hr by itself, but in tandem with a shovel, as we are using the wheel, its capacity is sharply reduced because a much longer boom is required. The weights of the three machines, in pounds, are:

| | |
|-----------------|-----------|
| Wheel excavator | 2,000,000 |
| 12-yd dragline | 2,000,000 |
| 25-yd dragline | 2,420,000 |

MOVING SPOIL FARTHER

The wheel excavator, in addition to moving more dirt per hour, also moves it much farther.

The extreme distance of movement when the wheel is extended is 358 ft from the tips of the buckets to the end of the stacker. Adding another 25 to 30 ft of throw, maximum dirt travel is 388 ft. When the wheel is retracted, the dirt travel is 338 ft. The average dirt travel is 363 ft. With 60-ft moveups, swinging reduces this average 10 ft or more or to 350 ft. With a 40-cu yd shovel, dirt is moved 207 ft when the shovel swings 180 deg. A swing less than 180 deg reduces the distance of movement accordingly. On this basis, productivity is as follows:

| | Yd per Feet | Hr Moved | Yd x Ft |
|--------------|-------------|----------|---------|
| Buckheart | | | |
| excavator | 1,700 | 350 | 595,000 |
| 40-yd shovel | 1,350 | 207 | 236,250 |

When we carry a 90-ft pit, the dirt is deposited 195 ft from the edge of the coal next to the spoil with the conveyors perpendicular to the pit. As the excavator swings, the dirt is brought in closer—some of it, but only a small part of the total, to within 95 ft of the coal edge. Most of the dirt is placed far back. A shovel in 55 ft of overburden would spoil 82 ft from the edge of the coal.

OPERATING COST

Since dirt-moving costs are proportionate to the size of machine used, machines of equal size must be used in comparisons. Our wheel excavators have had a materially lower cost per yard than the draglines they replaced because their output per hour is several times higher.

Our wheels are operated by the same three-man crews as our other units. Power costs per yard are the same as our shovels, or considerably less than our draglines. Repair costs should not be materially different. One large item of expense has been development and experimentation. The original wheel went into opera-

tion at Cuba in August, 1944. Since then, aside from the gantry for the ladder and part of the ladder retract, everything has been replaced—some items more than once. This cost was charged to operations, and we think it is now at an end. Even though operating cost was raised by these charges, it was always lower than the cost with the dragline which was replaced.

At this point, one question might be: "Why wasn't the wheel developed a long time ago?" It could have been. The base and the main part of the machine we are now using at Cuba was put on the market 25 yr ago, and it would have been just as easy to put a wheel and a conveyor on that base as a dragline or shovel. Meanwhile, we could have been moving 800,000 cu yd per month with the machine instead of 100,000. The saving that could have accrued to the stripping industry runs to tremendous sums.

When we got into it we ran into all the normal headaches to be expected in the development of a new idea, plus, as I have noted, a lot we didn't expect—bearings, belt speeds and so on. These unexpected problems gave us much more trouble than the basic design. In addition to ideas, there are detail and execution. There are months and years of thought back of any number of parts on these machines. You don't automatically get the right lips and teeth for the buckets, the right steel structure, the right bearings and gears, and hundreds of other items—all which have to be machined and installed right.

As first installed, the Cuba machine was a complete failure. The fact that the idea is now a success reflects a great deal of skill and hard work in the analysis of problems, ingenuity in their solution and—much more importantly—persistence. Idea and execution are self-evident when one watches the machine at work, but few people had any confidence in the idea when we started, and of those, only a part maintained their confidence to the successful conclusion of the program.

One of those who never lost his confidence was Charles Sosey, master mechanic at Cuba and the only fatality with the machine. He had spirit and was always in there fighting to make the wheel a success. Real credit is due John Huey, Chris Stamos, Gus Johansson, Jens Jesperson and Herman Bleibtrau, who have done the engineering, and Clarace Bell, superintendent at Cuba, and the operating organizations at Cuba and Buckheart mines for many helpful ideas but most of all for their spirit, which carried us through many bad periods.

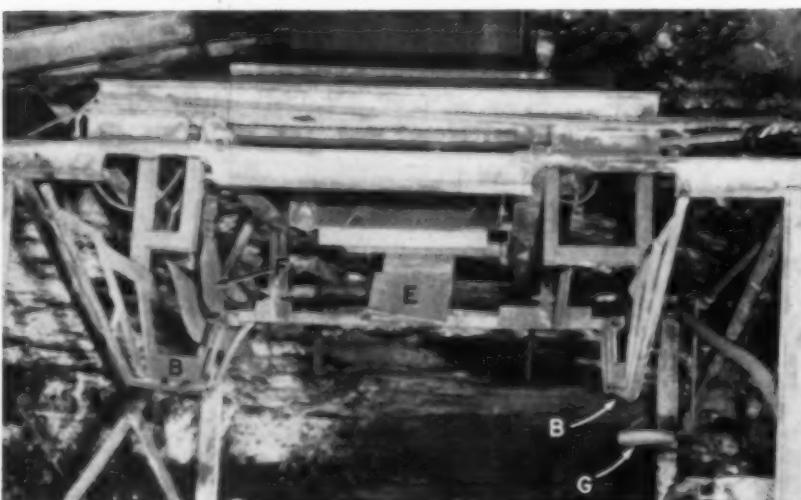
How to



1 AUTOMATIC STATION at belt head (left) includes frame, right, spanning track and supporting transfer pan, its operating ramps and limit switches.



2 AUTOMATIC STATION from the inby side, with the steel frame spanning the track. Letters indicate equipment functions detailed in this article.



3 RAMPS and certain other operating controls and limits as seen from the side of the automatic trip-loading station.

What's necessary in equipment and what results were attained . . . as pioneered in Mine 214, Consol of Ky.

A LABOR SAVING of one man per shift was one of the five principal advantages of an automatic loading point at a section belt discharge to mine cars in Mine 214, Consolidation Coal Co. (Ky.), Big Branch, Pike County, Ky. Other gains were more shuttle car trips and increased production through elimination of belt starts and stops during car changes, added belt life by reason of fewer starts, and, for the same reason, a reduction of 75% in maintenance work on starters and motors.

This automatic loading point, devised by C. M. Fields, assistant maintenance foreman, was in constant use during the last 19 mo of a 3½-yr period during which section belts were used in this area of the mine. What made the system really practical was the inclusion of alternate methods of actuating the controls and safety stops so that if one failed another took over. To offset the complications from adding limit switches, relays, contactors and wiring, it was realized that practicability would depend on incorporating the duplicate operating mechanisms, and also on quick ways of testing to locate electrical troubles.

COST RETURNED SEVERAL TIMES

Although the automatic loading point was in use less than 2 yr the labor saving alone returned several times the cost of the extra equipment. Elimination of the boom man for 9 mo of three-shift operation saved 3 man-shifts per day, and for 12 mo of two-shift operation saved 2 man-shifts per day. Saving in belt damage was evident but difficult to evaluate. Splice weaknesses and cut damages progressed much slower with the fewer starts of automatic operation.

Mine cars of 10 tons capacity were pulled past the loading point by a spotting hoist. A major problem in arranging for automatic operation of the hoist and belt was to build a simple but automatic transfer pan so that there would be no spillage in changing cars without stopping the belt. To supplement the control equipment a signal box was installed on the main

Automate Trip Loading

line to automatically tell the motor-man if the loading point needed empties, if loaded cars needed to be pulled, or if the belt was down. For simplicity these signal wires are omitted from the wiring diagrams accompanying this article.

Station and equipment are shown in the photographs, which were made after the section was worked out and a day or so before the equipment was removed from the mine. No. 1 is a general view showing, left, and belt head and drive and, right, the main frame straddling the track and carrying the transfer pan, control paddles, limit switches, etc.

HOW STATION OPERATES

Station control elements and operation are indicated by letters in four of the accompanying illustrations, as follows:

Photo 1-A, an extension at the bottom of a dust chute which swings into the car after it is spotted; **B**, two inverted double-end ramps or runners, which are pushed up by the top edge of the mine-car body to tilt a diversion pan for a short time (about 20 sec) while the car change is being made. The same inverted ramps also operate the dust-pan extension, **A**.

Photo 2, looking outby at the frame which straddles the cars—**A** and **B**, as in No. 1, show dust-pan extension and one of the ramps; **C**, one end of the transfer pan; **D**, pivot shaft for the pan; **E**, main paddle which starts the hoist when the coal piles up against it; **F**, two emergency, or side spillage,

paddles with limit-switch contacts connected with the switch of the main paddle; **G**, rubber-faced wheel or roller of a limit switch actuated by the wheel rolling along the side of the mine car. While the roller is between two cars its limit switch keeps the trip moving to complete the car change initiated by the main paddle, **E**.

Photo 3, looking inby—**B** again denotes the inverted ramps; **E**, main paddle which, when contacted by the coal, starts the hoist; **F**, emergency side paddle; **G**, limit switch to keep the trip moving during car change.

Photo 4-H and **I** denote two of four limit switches 50 ft inby the loading point and operated by wheels or rollers against the sides of the cars to stop both hoist and belt if a car is derailed and off center 2 in or more from the track. Without that protection a wrecked car could badly damage the straddling frame and controls. **J** and **K** limit switches, at the right and also equipped with wheels or rollers, have their contacts connected in parallel and their function is to keep the belt running until the entire trip has been loaded.

Switches **J** and **K** are spaced so that when **J** wheel drops off the rear end of the car and breaks its circuit, **K** wheel is still riding the car, keeping the circuit closed and the belt running. When all the cars have passed by the loading point the wheels of both limit switches spring inward to stop the belt. Reversing the process, the belt starts automatically when a

new trip of empties is in loading position and is holding the switch wheels back.

TROUBLE-SHOOTING FACILITATED

Electrical controls for the automatic loading point are shown in Photo 5. The Westinghouse belt starter, rated 20-40 hp, 275 v, is in the base cabinet. The box on top at the right contains a General Electric relay and switch which delays starting of the hoist for 2 sec after the main paddle (**E** in the photographs) has made contact to start the hoist. This delay is necessary to avoid pumping.

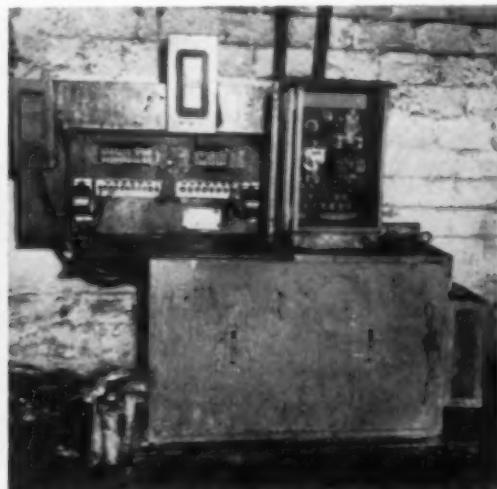
The larger cabinet on top of the starter contains two Agastat timing relays and, in addition, an arrangement of terminal blocks and indicating lamps for quick location and clearing of electrical troubles. One side is for the hoist and the other for the belt. Each panel is wired with independent circuits in parallel. To test for troubles in the hoist controls, a single-pole double-throw knife switch is closed to the hoist position. Lighting or non-lighting of lamps indicate the circuit condition and where the trouble is located. Belt-control troubles are located by throwing the single-pole switch to the other position.

On the accompanying wiring diagrams limit-switch contacts indicated by letters are those shown by the same letters on the photographs, except for Switch **M**, of the hoist diagram, which is not shown in the photos.

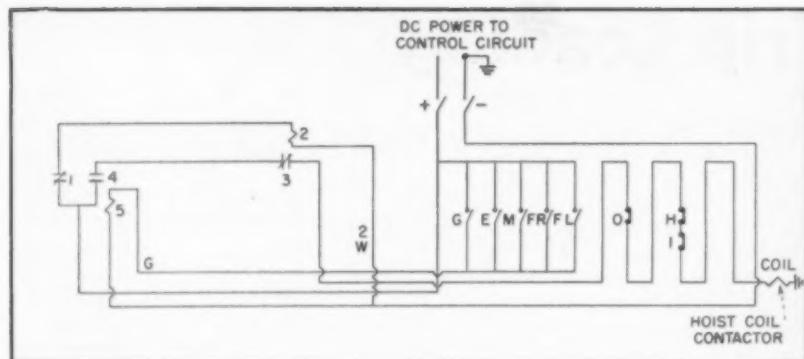
In the hoist diagram, when the manual DC power control circuit



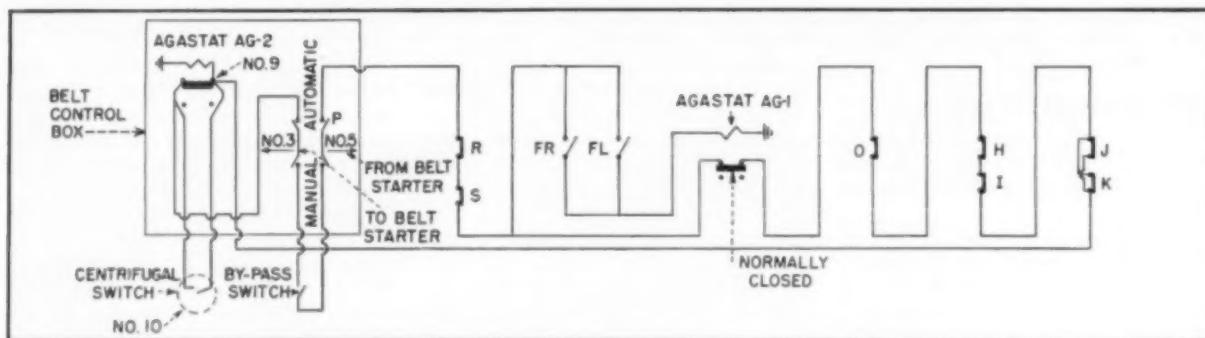
4 ROLLER OR WHEEL LIMIT SWITCHES detect wrecked cars and start or stop belt when empties are set in or loading is done.



5 QUICK TROUBLE LOCATION is provided by terminal boards in control station.



HOIST-CONTROL CIRCUIT for automatic trip-loading station (left). Signal box on main line near loading station (photo) informs the motorman if empties are needed, a trip is ready to pull or the belt is down.



BELT-CONTROL CIRCUIT for automatic trip loading.

power switch is closed, positive power enters the relay box, passes through the normally-closed contact, 1, and through Coil 2, thus opening normally-closed Contact 3. The car-spotting switch, G, normally closed, is opened by the mine car forcing the roller away from the center of the track.

When cars are not in position to be loaded the limit-switch roller drops between cars and G switch closes, putting power through Coil 5 which opens normally-closed Contact 1, taking power off the coil to permit Contact 3 to close. At the same time normally-open Contact 4 closes and permits positive control power to flow from the relay box through H and I switches to the hoist, thus starting it for spotting the next car.

Switch E, closed by the paddle, which is pushed over by the piled coal, likewise starts the hoist. A timing relay in the panel box is set for 2 sec delay for Contacts 1, 2 and 4, and prevents false starts from flutter of the paddle.

Contact M is operated by tilting of the transfer pan and is kept closed while the pan is tilted during the car change. This pan switch is a safety means of stopping the hoist in case G fails.

Side-paddle spillage switches, FR

and FL, likewise start the hoist and serve in case of failure of Paddle Switch E. These FR and FL contacts are in the same double-pole limit switches as those designated by the same numbers on the belt control diagram, and thus these limit switches control both hoist and belt.

The belt diagram includes, inside the belt-control box, a double-throw double-pole switch or contactor, P, effecting automatic control in one position and providing for manual control in the other, this latter being for use when making repairs to the automatic circuit.

PROTECTING THE EQUIPMENT

Control power must flow through an emergency switch, R, at the end of the belt and through several Roxbury belt emergency pull cord switches, S, connected in series and 200 ft apart. One pull stops the belt and two pulls start it.

Switches FR and FL, which back up the paddles guarding against car overload, stop the belt if, after 4 sec, the hoist has not pulled the cars ahead far enough to permit the paddles to move back to normal position. An Agastat, AG-1, provides the delay.

Switch O is the limit switch on the hoist and is operated either by physical contact with the trip or by rope

deflection. Switches H and I are the wrecked-car switches located 50 ft inby the loading point. Switches J and K stop the belt when a loaded trip has passed by, and start it when a new trip of empties is placed.

Control power must pass through Agastat AG-2 and across its normally-closed contacts. After 11 sec delay, giving the belt motor time to attain full speed or to at least get directly across the line, this Agastat opens its contacts and directs the current through an Ensign centrifugal switch to stop the unit. The belt can be restarted only by the opening and closing of any switch in the control circuit.

Where both hoist and belt circuits go to a limit switch, 4-conductor cable is used; to the other switches, 2-conductor cable. All control wires and cables are carried back through the panel terminal board where they are identified by letters. Since there are two switches for each job, leads can be taken loose at the panel to test by leaving one switch in service.

The limit switches are Clark, hatchway, Type HL, spring return. As indicated in the switch drawing, each pole of the switch may be independently changed from normally-open to normally-closed and vice versa. This is done, without disassembly, by rotating the fiber cams.

The Coal Commentator

Jumping Quantums

"It will not invalidate the present investment in power-plant equipment but will simply provide a method for more efficiently utilizing natural fuel resources."

Coal men subject to palpitations when the subject of new energy sources comes up should really get braced for this one—the "quantum jump"—which its inventor, Harry Hardsog, a retired army colonel and former Defense Department research and development officer, who is being backed by Fairchild Engine & Airplane Corp., says will increase the Btu output of a pound of coal 8,000 times. The list of "Men from Missouri" includes quite a few hard-headed scientists with some experience in taking matter apart and putting it together again for energy and other purposes.

But the "quantum jump" again points up the fact that all the "Buck Rogers" substitutes for coal and other mineral fuels have yet to progress beyond the "show-me" stage. That includes the atom and also solar energy—the latter now having become so glamorous that a 4-day "World Symposium on Applied Solar Energy" will convene in Phoenix, Ariz., Nov. 2. For perspective drawing, however, D. P. Barnard, deputy assistant secretary of defense for research and development, has a refreshing approach. "What," he asks, "if we had nothing but nuclear power plants?" His list of reasons why we would be welcoming coal and its present rivals with open arms is lengthy, impressive and comforting.

Horse and Man

Interesting reading from abroad includes the British annual reports on "Safety in Mines Research." Among the items in the 32d such report, for 1953, is the following:

"A humane horse killer which is loaded with commercial smallbore ammunition and discharges a lead bullet when fired (the propellant being a standard smokeless powder) has passed tests in firedamp-air mixtures. . . . The killer has now been approved for use in safety-lamp mines, subject to provisions relating to general safety in handling this lethal weapon."

It can be assumed that the British are no more eager than we to shoot a horse and would rather that neither horse nor man find itself or himself in a situation where drastic steps are necessary. Therefore, they also devote a lot of time and money to preventive research—for example, the 1953 reports includes a discussion of 83 separate projects. Vacuum dust collection on roadways is one; pulsed infusion of coal is another, involving drilling holes, filling them with water under pressure to infuse the coal, and then shooting the holes while still under pressure.

Paving the Way?

Schenectady, N. Y., Dec. 24—Manufacture of the General Electric Co.'s. 100th combustion gas turbine has been announced by John P. Keller, general manager of the company's gas-turbine department. Ninety-seven units are in operation: 40 pumping natural gas, 27 in locomotives, 10 for pressuring oil fields, 19 for electric-power generation and 1 in an oil refinery.

This GE announcement further confirms the expectation that the gas turbine will be a significant factor in power operations in the future. As Mr. Keller puts it: "We anticipate an opening of new markets, with the development of new units to fit many industries." When taken with an announcement by the Locomotive Development Committee, in the October-January, 1955, issue of *Bituminous Coal Research*, that the problem of cleaning up a coal-generated gas stream has been solved with the Mark III Dunlab ash separator, it can be concluded that coal is closer still to the time when it can get back on the railroads in a big way, in addition to becoming an active contender in the marine and certain other special fields. Maybe coal can pump the gas—and make it too.

Still Dangerous

Some recently published figures on the number and capacity of natural-gas storage pools point up the still critical question of the hazard to coal mines of large bodies of gas under high pressures under or near mining areas. The majority of the 167 storage areas, with 5,789 known wells for input, withdrawal and pressuring are located in the coal fields. Unknown wells of course cannot be counted, but they are there and are among the chief hazards. Capacity of these pools is 2 trillion cubic feet and the heavy concentrations are in Pennsylvania, West Virginia and Ohio. In 1943, there were only 50 pools with a capacity only one-tenth that of the present.

Twelve more storage areas are being built and in addition the growing net of surface lines is no small hazard in itself, with the result that the Bureau of Mines has found it necessary to issue a pamphlet specifically on gasoline lines over coal mines. Reports are that a reasonably satisfactory compromise of the interests of mine owners and gas companies in storage facilities has been reached in Pennsylvania and will serve as the basis for legislation. If so, some progress has been made in solving a critical problem. More will help, because any way you slice it underground gas pools and surface lines, both under high pressures, are hazards in coal-mining areas, and their construction and operation should be surrounded with safeguards equal to those required of mining men in the operation of their properties.

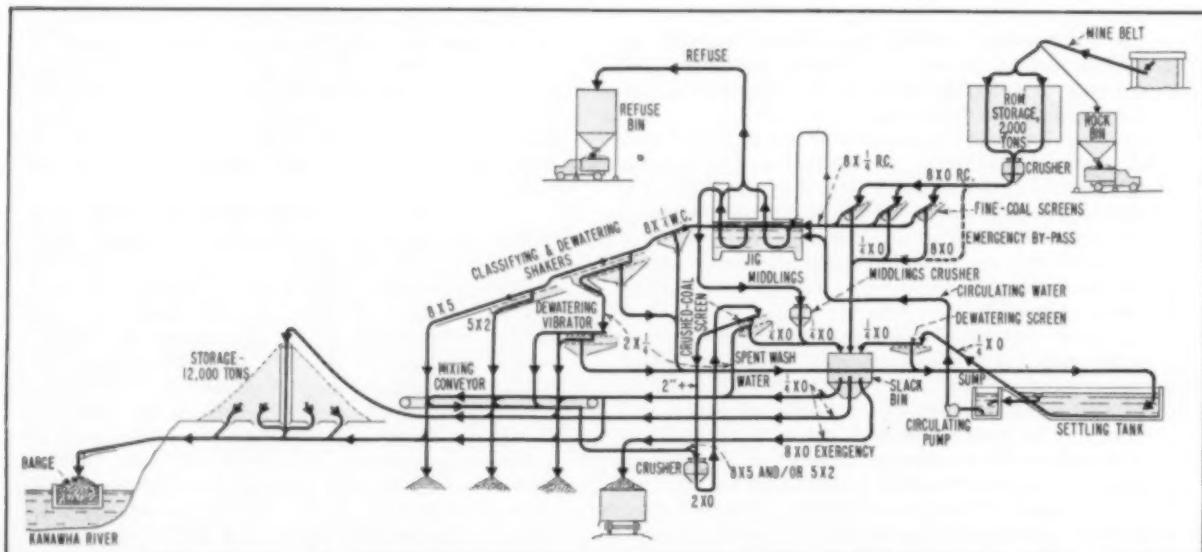


FROM BELT PORTAL TO RIVER, surface facilities at Valley Camp No. 8, designed to produce quality products at minimum cost, include raw-coal storage, main preparation plant, clean-coal storage and river belt, which ducks under the storage pile to facilitate reclamation and delivery to the barge-loading station.

The Valley Camp No. 8 Story

Surface: Raw-coal storage, jig washing, clean-coal storage, rail and river loading.

Underground: Thin coal mined with rubber-tired loaders and conveyors.



STRAIGHT-LINE FLOW wth both raw-coal and clean-coal storage feature coal travel through Valley Camp No. 8 surface plant, loading to railroad or to the Kanawha River.

By J. H. EDWARDS
Associate Editor, COAL AGE

CONFIDENCE in the future of the coal business is exemplified in development of the new No. 8 mine of the Valley Camp Coal Co., Shrewsbury, Kanawha County, W. Va., marked by careful planning and engineering to produce quality products at minimum cost. The preparation plant loads to the New York Central R. R. and the Kanawha River and is in the very heart of a major power-generating and chemical-manufacturing district—for example, 0.5 mi upstream from the 280,000-kw Cabin Creek plant of the Appalachian Power Co. and 3.3 mi downstream from the 400,000-kw Kanawha River plant of the same company.

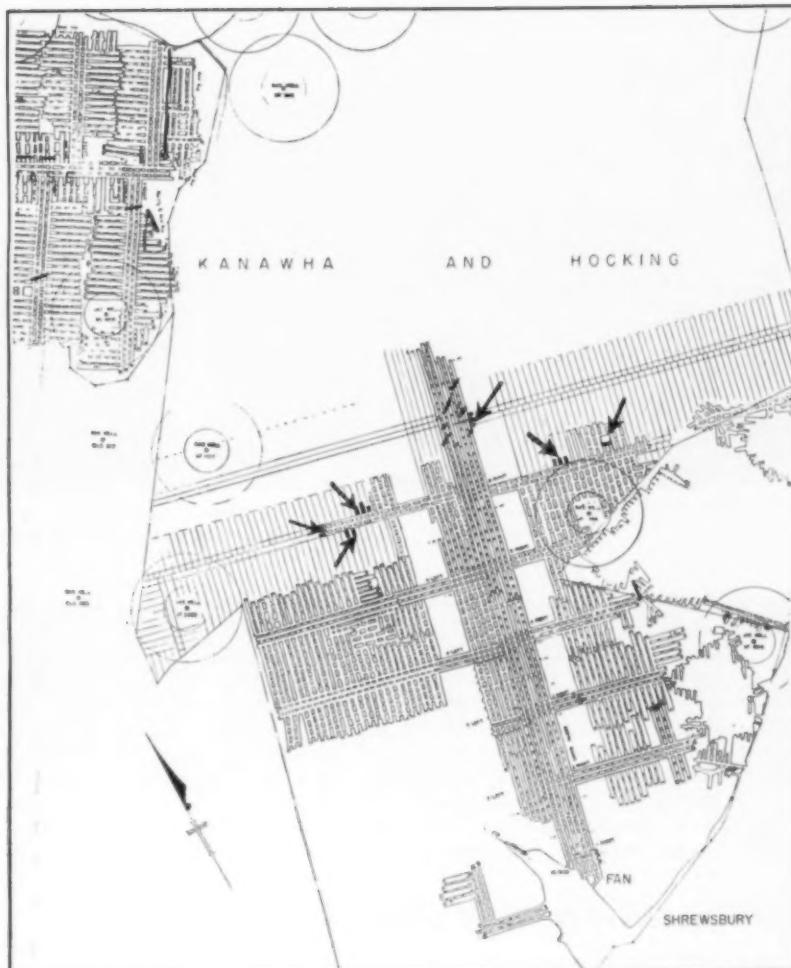
Valley Camp No. 8 mine is recovering the 36-in Cedar Grove seam yielding excellent steam coal for preparation to premium quality in the new plant. Most of the coal is mined by shortwall cutting machines and Jeffrey CLR conveyor loaders operated on a plan which, in relation to the thinness of the coal, results in a favorable tonnage per man-shift. Transportation consists of chain conveyors to section belts, with a mainline belt to the outside.

The preparation plant features simple straight-line flow and incorporates storage for 2,000 tons of raw coal, jig washing, complete flexibility and live storage for 5,500 tons of washed coal above a belt conveying from the plant to the barge-loading tower. To put bidders on an equal basis consulting engineers were employed to help in preparing drawings and general specifications.

RESERVES FOR LONG LIFE

The Valley Camp Coal Co., now operating eight mines in Kanawha, Ohio, Marshall and Monongalia counties, in West Virginia, has general offices in Cleveland and sales offices in 13 cities in the United States and eight in Canada. Valley Camp moved into Kanawha County in 1917 by purchasing the Kelley's Creek Colliery Co., Ward, W. Va. The acreage adjoined that of the Kanawha & Hocking Coal & Coke Co. In 1950, Kelley's Creek No. 4 mine, in the Cedar Grove seam, was worked out. Later, in 1951, Valley Camp purchased Kanawha & Hocking, thereby acquiring 15,000 acres, including approximately 7,000 acres of Cedar Grove coal and large acreages of several other seams, including the No. 2 Gas, Coalburg, No. 5 Block, Lewiston and Winifrede.

With approximately 24,000,000 tons of Cedar Grove coal and approxi-



MAINS DEVELOPMENT and active working places, shown by arrows, in Valley Camp No. 8 mine. Now 1 mi. long, the mains will extend several additional miles in the same direction in the future.



PRODUCTION MAINSTAY at Valley Camp No. 8 is rubber-tired conveyor loader with telescoping head, here shown at work in 37 in of coal.



LOADING FACILITIES include four tracks, three with belt booms, at the main plant, and a hinged section on the river belt providing for a maximum range of 20 ft in river stage.

mately 50,000,000 tons from other seams, a long-life plant was indicated and the general specifications were drawn up accordingly. Plant location was selected to permit shipment by both rail and river. At Shrewsbury the Cedar Grove outcrops 140 ft above the elevation of the railroad within 1,000 ft of the Kanawha River.

Company officials active in decisions, design, building and opening

of the mine and plant include: H. T. Ewig, president; Herbert S. Richey, executive assistant; Thomas Courtney, director of sales; O. B. Pryor, vice president-operations; Allen Newcomb, electrical engineer; Alan McBane, general manager, Southern Div.; Ed Simmons, division engineer; Joe Marshall, safety director; and Paul Smith, general mine foreman, Valley Camp No. 8 mine.

Preparation at Valley Camp No. 8

Fed from two bins receiving coal from the mainline belt and using a Jeffrey two-compartment five-cell Baum-type jig, the No. 8 plant represents the combined efforts of the following: Allen & Garcia, preliminary design; Kanawha Mfg. Co., detailed design, furnishing of material and erection of the 425-tph plant; Valley Camp, grading, excavating, installation of concrete foundations, and construction of the concrete settling tank and the tunnels under the washed-coal storage area.

2,000-TONS RAW-COAL STORAGE

Capacity of the two raw-coal storage bins is 1,000 tons each. They receive coal from the 5,400-ft mainline underground conveyor extending out of the portal, and are fabricated of Armco corrugated tunnel liner plates. Each bin is equipped with a coal-lowering ladder for filling with minimum degradation. Bin dimensions are: diameter, 32 ft; height, 62 ft. Each consists of 41 rings, the lowest four of 3-gage steel; the next 14, 5-gage and the remainder, 7-gage. Each bin is stiffened on the outside by four steel columns which support

the superstructure, and by 12 angles running the full height.

The mine conveyor terminates at a chute delivering into the top of the first bin. An apron conveyor in the superstructure carries coal to the second bin. Mine rock can be diverted to a 250-ton Armco bin adjacent to the first bin.

PLANT FEED CRUSHED

A 42x84-in Jeffrey-Traylor electric vibrator under the first 1,000-ton bin feeds to a Jeffrey 30x36-in double-roll crusher of the extra-heavy-duty type. An apron conveyor 40-in wide, 25 ft long and driven through a variable-speed gear, feeds back from the second bin to the crusher. The 8x0 crushed raw coal is elevated and carried overhead across U. S. Highway 60 to the top of the preparation plant by a 36-in belt conveyor, 615-ft centers.

VARIED PRODUCTS POSSIBLE

Vibrators divide the crushed raw coal into 8x $\frac{1}{4}$, which goes to the jig, and minus- $\frac{1}{4}$, conveyed to a 60-ton slack bin. From the bin the coal can be loaded by direct chute to a track, sent to a mixing conveyor for reas-

sembly with prepared sizes, or sent to the river-loading tower or the ground storage area. In emergency the raw 8x0 can be diverted to the 60-ton slack bin for direct rail loading or ground storage. As a further possibility, the double-roll crusher under the 1,000-ton bins can be adjusted to crush to the minimum size, with the product going to the river or ground storage.

The washed 8x $\frac{1}{4}$ is dewatered and classified into 8x5, 5x2 and 2x $\frac{1}{4}$, all three boom-loaded into railroad cars. The 2x $\frac{1}{4}$ gets a second dewatering before arriving at the loading boom. Fine coal recovered from the settling tank and dewatered on a vibrator is reassembled with the 4x0 slack. A mixing conveyor performs the double function of reassembling the sizes on the tracks and conveying the plus 2-in washed coal to a crusher for reduction to 2-in when desired. This product is screened to plus 2-in and minus $\frac{1}{4}$ -in, the former being recirculated through the crusher and the latter sent to slack.

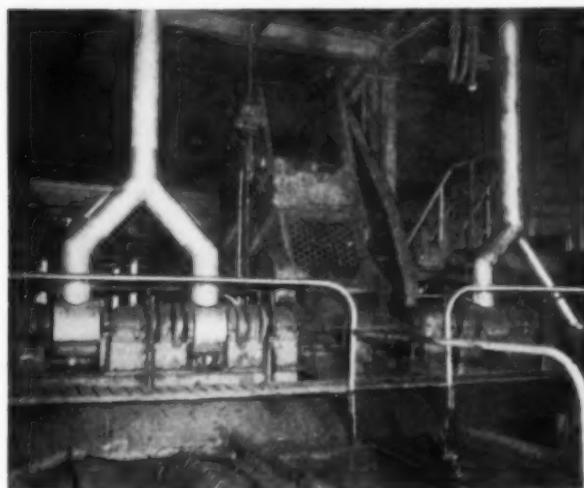
When 1 $\frac{1}{4}$ x0 steam coal is to be made, 2x1 $\frac{1}{4}$ is taken from the dewatering vibrator and sent to the crusher. middlings for the jig can be sent to refuse or crushed to $\frac{1}{4}$ in and delivered to the raw slack bin.

CLEAN-COAL STORED

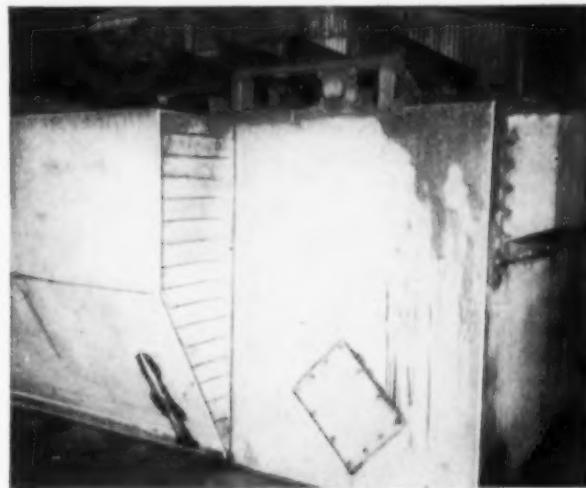
All sizes, separately or in combination, can be conveyed to the river for loading into barges. Ground-storage facilities are provided for storage and recovery of 2x0, or the 2x $\frac{1}{4}$ and 4x0 fractions thereof. While one of those sizes is stored the other goes to either rail or river. Coal reclaimed from the storage pile is delivered to the river only. The 5,500 tons of live storage is



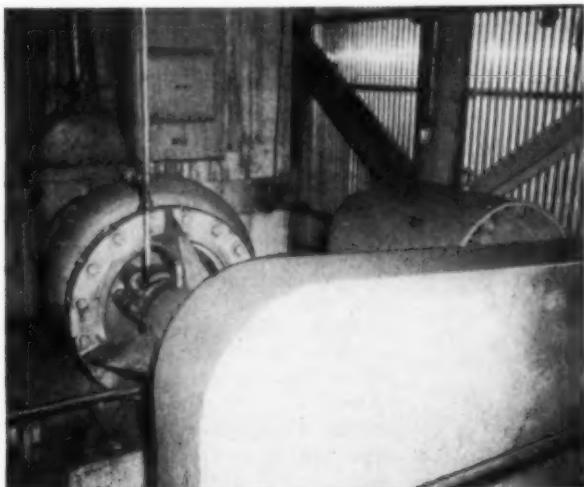
PROCESSING FOR QUALITY begins with discharge of the coal to two 1,000-ton bins accompanied by 250-ton rock bin. Clean-coal storage (right) is handled by cantilever stacker which can pile to 69 ft.



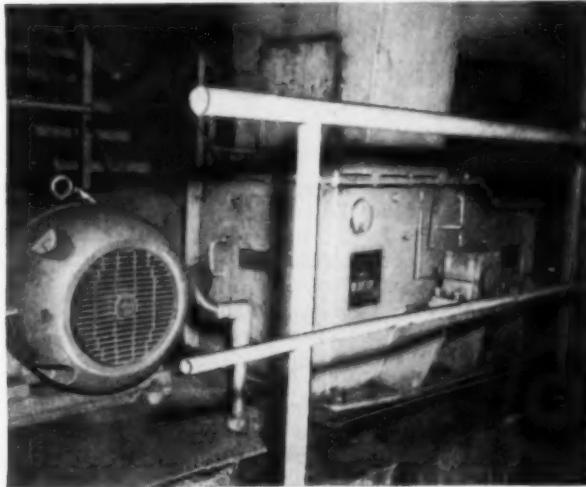
BAUM-TYPE JIG washes 8x $\frac{1}{4}$. Vertical ducts through roof reduce air-vale exhaust noise.



VALLEY CAMP SLUDGE TANK features sloping sides and steel plate for easy access to lower tail-shaft bearing.



BIGGEST PLANT MOTOR, 125 hp, drives this pump re-circulating water to the washery.



CRUSHING FACILITIES include this ring-type unit for breaking down middlings prior to recirculation.



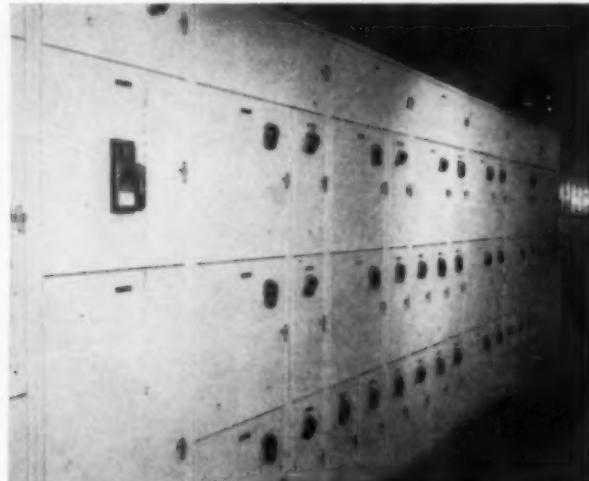
RETARDER BRAKE RELEASE is accomplished by 5-ft lb motor, gear and rope drum, with remote push-button control.



QUALITY CONTROL is facilitated by laboratory for ash analysis, moisture and Btu determination near plant.



CONTROL PANEL for main plant (left) was factory-assembled. Control console (right) was positioned so that one man could operate jig, control the plant and assist with car-dropping.



the quantity that can be drawn off by opening valves into the river-belt tunnel and into two cross tunnels equipped with chain conveyors delivering to the river belt.

JIG NOISE REDUCED

A Dings stationary magnet hung over the mine belt at the pit mouth removes tramp iron. From the crushed-raw-coal belt discharge in the top of the preparation plant a 42-in x 42-ft scraper conveyor with valves proportions the coal evenly to three 5x14-ft double-deck vibrators—Tyler Ty-rock F-600 with Flat-top 1 1/4-in opening 0.25-in-diameter wire on top and Ty-rod 1/4-in round equivalent on the bottom. The Jeffrey air-operated jig is the standard 84-in machine with a refuse-withdrawal rating of 150 tph. Rated water con-

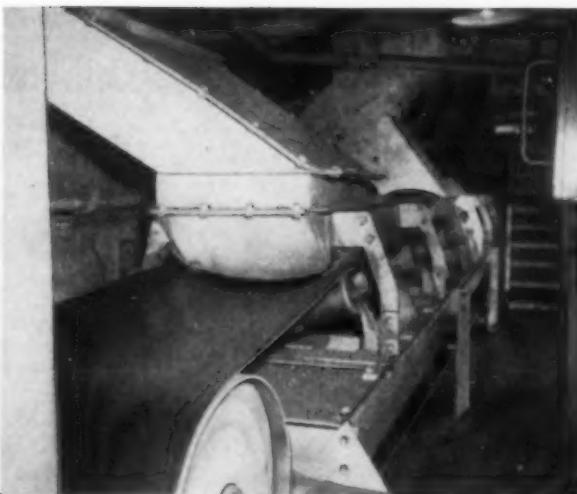
sumption is between 2,500 and 3,500 gpm. The compressor is a rotary positive-type unit. To reduce noise at the plant operator's control panel, which is near the jig, the coal company added hoods to the jig air valve exhausts with vent pipes out the roof.

Primary dewatering and classifying is done on a Parrish-type high-speed shaker consisting of two balanced sections 7 ft wide and operating at 150 strokes per minute. The dewatering vibrator is an Allis-Chalmers 6x12-ft double-deck low-head. The three loading booms are duplicates and each consists of a 42-in belt conveyor, 18-ft horizontal section and 48-ft boom section. The 2x4 boom can be raised to deliver to the ground storage conveyor. This boom, like the two others, is equipped with a Jeffrey automatic chute for car changing.

BELTS WIDELY USED

Belt conveyors are used as far as practical throughout the plant. Four 24-in belts in the plant proper range from 28 ft to 67 ft long, centers distance. The 28-ft belt moves slack from the fine-coal vibrators to the 60-ton slack bin. A 35-ft unit moves the 1/4x0 crushed-coal undersize and dewatered fine coal from the settling tank to the aforementioned slack bin conveyor. The 67-ft belt conveys crushed middlings to the slack bin, while a 48-ft unit carries 1/4x0 to either the mixing conveyor or the river belt.

The mixing conveyor, a scraper type unit 42 in wide and 82 ft long, performs the double function of reassembling on the top run and carrying the larger sizes to the crusher on



CHUTES CAN LOAD 8-IN R-O-M or any one of five clean coal sizes to 652-ft 30-in river belt.



THREE GATES over river belt and two ends of cross conveyors draw coal from storage for river loading.



CENTRALIZED LUBRICATOR supplies main shaker, jig elevators and air valves.

the bottom run. The crusher, reducing 8x5- or 5x2- to 2 in, is a Pennsylvania Ring-Type Granulator Size TK-4-30, 500 rpm, 150-tph capacity.

Crushed coal is sized on a Robins 5x14-ft double-deck Vibrex screen with 2-in spring-wire cloth on the top deck and $\frac{1}{4}$ -in on the bottom deck.

Concrete sludge tank dimensions are: top width, 14 ft; bottom width, 9 ft; depth, 8 ft; length, 70 ft. Effective area of settling surface is 1,000 sq ft.

Sides tapered to a narrower width at the bottom make it possible to use a narrower conveyor. Conveyor width is 8 ft and length is 110 ft -68 ft horizontal and 42 ft sloping. Removable steel cover plates on the sides at the back end of the tank provide access to the bearings of the lower tail shaft.

CLOSED CIRCUIT EFFECTIVE

The extra-large settling area in the sludge tank permits normal operation without bleeding to the outside, except for push water in the refuse and middlings chutes, which goes directly to settling ponds outside the plant. These same ponds receive the water when the plant is drained periodically for inspection and repair. Otherwise, the plant works on a closed circuit and the system has been approved by stream-pollution-control authorities.

Fine coal from the settling tank is dewatered on a 5x12-ft Allis-Chalmers double-deck Low-Head screen equipped with 28M stainless-steel cloth. Middlings are crushed in a Pennsylvania Ring-Type Granulator, size TK-2-A4, 900 rpm, 40-tph capacity. Jig water is circulated by a 12x14-in Allis Chalmers Type CW pump driven by a 125-hp motor, the largest in the plant. The ground floor sump pump is a Hazleton 4-in twin volute unit, 400-gpm. Car retarders are Kanawha gravity type and the loading booms are controlled by Yale 3-ton hoists.

Equipment for slack storage, recovery and river loading was built by Jeffrey and installed by Kanawha. A 30-in by 57-ft transfer belt delivers from the booms or 60-ton slack bin to the storage-pile belt. This storage belt, 30 in wide, 195-ft centers, elevates to form a storage pile 69 ft high, 12,000 tons maximum. At the hooded discharge a stationary steel chute with gravity doors lowers the coal.

Extending from the tipple to the river but dipping enroute through a tunnel under the storage pile is a 30-in belt conveyor 652 ft long, including a 63-ft boom for adjustment to load barges through a 20-ft range of river

level. The belt is a two-speed unit, 250 fpm for double-screened coal and 500 fpm for slack. Maximum capacity is 400 tph.

STORAGE FEEDS RIVER BELT

Three hoppers and gates in the top of the tunnel draw coal directly from the storage pile to the river belt. Two Long Co. chain-flight conveyors are installed in a cross tunnel 80 ft long to pull coal to the belt from hoppers and gates 35 ft away. With a 69-ft pile and the arrangement of five hoppers with gates, 5,500 tons of live storage is possible. Ground is available for a much larger storage but such storage would require bulldozing.

A Yale 5-ton hoist handles the river boom. The lower section of the discharge chute can be revolved 360 deg by motor control. The tower house overlooking the barge position has the following push-button controls: "Barge Mover," "Raise and Lower Boom," "Swivel Chute Control," "River Belt-Fast and Slow" and "Tunnel Cross Conveyors."

Barge anchorages comprise 13 piers consisting of rock and concrete filled cells formed by interlocking steel pilings. The center pier is 20 ft in diameter and serves as the foundation for the tower. Two other piers are 15 ft and the remainder are 5x5-ft square units. Pier installation was done by Phil & Miller, Pittsburgh, Pa.

A turbine pump is installed on one of the 15-ft piers (p. 104). It delivers river water to a 55,000-gal Caldwell wood-stave tank on the hillside at an elevation resulting in 90 lb of water pressure at the ground level of the preparation plant.

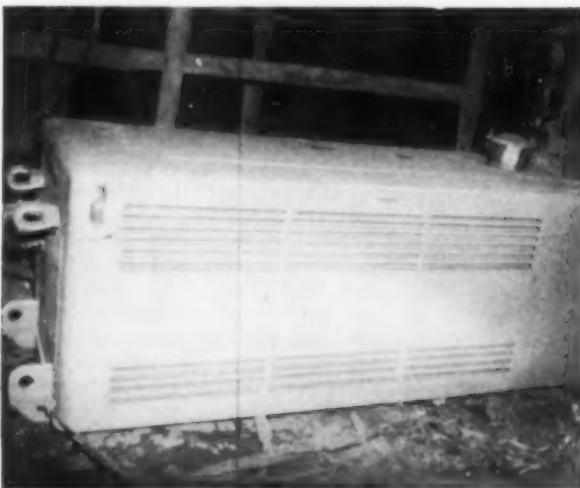
Equipment to heat the preparation plant consists of a Pacific low-pressure



DRILLING FOR SHOTHOLES is with handheld unit. Holes are immediately under thin slate band 3 in from top.



MAINLINE BELT serving No. 8 mine is driven by 125-hp motor immediately inside the mine portal.



LOAD CENTERS supply 440-v AC for conveyors. The two 112-kva units include grounding transformers and resistors.



DC FOR MACHINE OPERATION is supplied by two portable mercury-arc rectifiers—one shown in place here.

steam boiler, a Dunham condensation pump and 10 Dunham unit heaters. This system is designed to keep the plant at 60 deg in minus 10-deg weather.

Structures are steel and the floors above ground level are 4-in reinforced concrete. Stair treads consist of inverted steel channels filled with concrete. Sheeting is industrial corrugated aluminum 0.032 in thick.

Practically all bearings in the plant are anti-friction. Those of the sleeve type, on the shaker screen and jig elevators, are lubricated by a Farval centralized system.

Kanawha Mfg. Co. has contracted to install in the preparation plant a Roto-Clone wet-type dust-control system made by the American Air Filter Co. Dust-collection points will include the three raw-coal vibrators and sev-

eral coal-transfer points throughout the plant. Another contract will be let to install dust-collecting equipment under the two, 1,000-ton raw coal storage bins.

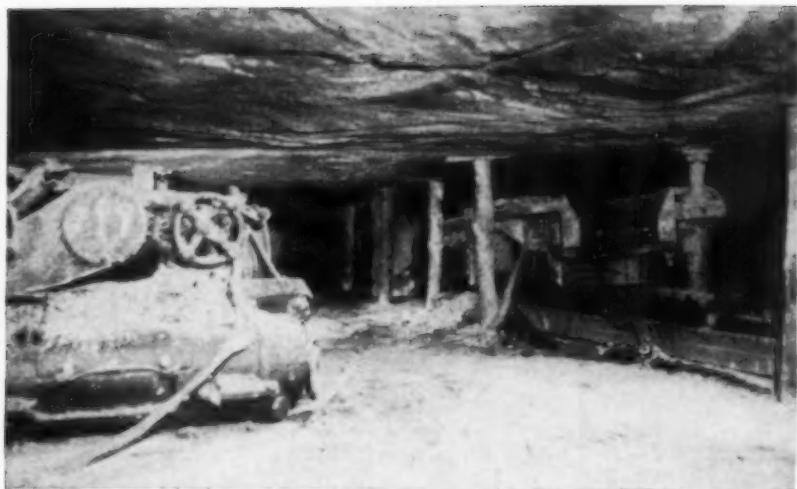
With the present output of 2,600 tons of clean coal per single-shift day, reject is approximately 135 tons, or 5% of the feed. Hauling of refuse is let to a contractor who disposes of some for land and road fills in the community and adds the remainder to a refuse pile on the company property only 1,000 ft from the preparation plant. Tested at 1.55 gravity the refuse shows 2.3% of very high ash float. Except when faults are encountered in the mine the material the plant removes consists principally of the high-gravity slate parting.

The plant force consists of seven men, including two maintenance men

and two wood pickers. The plant foreman, plant operator, car dropper and river loading man constitute the other four. One of the wood pickers works on the crushed raw coal belt at the base of the two 1,000-ton storage bins and removes the larger pieces of wood. Another picks wedges and other small pieces from the washed coal shakers. A wood-catching basket in the jig was unsuccessful because it caught too much coal and not enough wood. Wood pickers pay for themselves by salvage of wedges and posts which are difficult to see when loaded inside the mine due to small clearance between top of loaders and roof.

CONTROL BOARD NEAR JIG

The plant operator also functions as the jig operator. This is made possible by the position of the plant control



TAIL OF CONVEYOR LOADER is shown anchored to pivot jack beside room conveyor. Shortwall (left) is parked 40 ft from face during shooting and loading.

board near the jig and adjacent to a large sloping window looking down at the loading booms and cars. This plant operator also assists the car dropper, and the river loading man also assists in car dropping when not loading to the river.

Seven stations of a Femco loud-speaking system aid in plant operation. Three of the stations are in the preparation plant and the others at the mine portal, at the tops of the two 1,000-ton bins, in the crusher room under the bins, and in the control room in the control tower at the river bank.

Falk reduction gears are used in practically all of the principal plant motor drives. Dodge steel pulleys with Taper-Lock hubs are used on belt-conveyor drives. Conveyor-belt idlers are Jeffrey roller-bearing type with high-pressure grease fittings for one-side lubrication.

DESIGN REDUCES MOTOR LOAD

A relatively small number of electric motors and a relatively small connected load, considering the size and flexibility of the plant, attest to the simplicity of design. There are 48 principal motors and the total connected horsepower is 860. Practically all the motors are General Electric totally-enclosed fan-cooled, and most are

Type KG. Starters are grouped in a General Electric Cabinetrol and the control buttons are grouped on a console of the same make. All wiring is in galvanized heavy-wall threaded conduit and is splashproof to permit hose-down for cleaning, which is done every evening on the third shift.

All motors are 440-v and power at this voltage is fed from three transformer substations: one at the storage bins, one at the preparation plant, and one at the river. The largest station, at the plant proper, consists of three 250-kva Maloney transformers reducing from 2,400 v.

QUALITY CONTROL STRESSED

Close to the plant the coal company has a modern laboratory for making ash and moisture tests, as well as Btu determinations. Principal equipment consists of a Thelco moisture oven (Precision Scientific Co.), a Volland magnetic-damper Chain-O-Matic balance, an ash oven (Hevi Duty Electric Co.) and an oxygen-bomb calorimeter. One man is employed at the jobs of sampling, preparing the samples and making the analyses. A room is provided in the plant to prepare samples for the laboratory. Equipment consists of a Robt. Holmes sample crusher, pulverizer, and screens and sample quartering devices.

Low-Seam Mining at Valley Camp No. 8

With, as noted previously, a seam running 36 in thick, 124 underground men at Valley Camp No. 8 mine (62 per shift) produce 2,735 tons of material a day, which nets 2,600 tons of clean coal. The mine is in a 7,000-acre Cedar Grove tract of approxi-

mately 24,000,000 tons. The seam yields a high-quality steam coal and is clean except for $\frac{1}{4}$ - to $\frac{1}{2}$ -in partings of high-gravity slate 3 in from the top. Faults are occasionally encountered and these result in loading of some additional high-gravity material.

CONVEYORS UNDERGROUND

The immediate top is a strong sandy shale normally 10 to 12 ft thick. Bottom is a fire clay-hard when dry but soft when wet. Fortunately the operation can be classed as a dry mine. Although the seam outcrops along the river and is fairly level, the mine is classed as gassy. Because of the generally strong character of the roof, posting is used instead of roof bolts. Most of the loading is done with Jeffrey CLR conveyor loaders and the coal is transported entirely by conveyors.

Principal equipment in use in the mine is:

12 Jeffrey CLR conveyor loaders.

2 Joy 12-BU loaders.

1 Goodman 865 crawler-mounted loader.

1 Whaley Automat loader for slate and rock.

16 Goodman 512 shortwall cutters with bugdusters.

16 Jeffrey A7 hand-held electric coal drills.

16 chain-flight room conveyors—13 Type 400R Long units and three Jeffrey Type 61AM.

2 section belts, Jeffrey 30-in, Type 52B.

1 mainline belt conveyor, 5,400 ft long, Jeffrey Type 64A, fitted with Goodyear and Hamilton rayon belting.

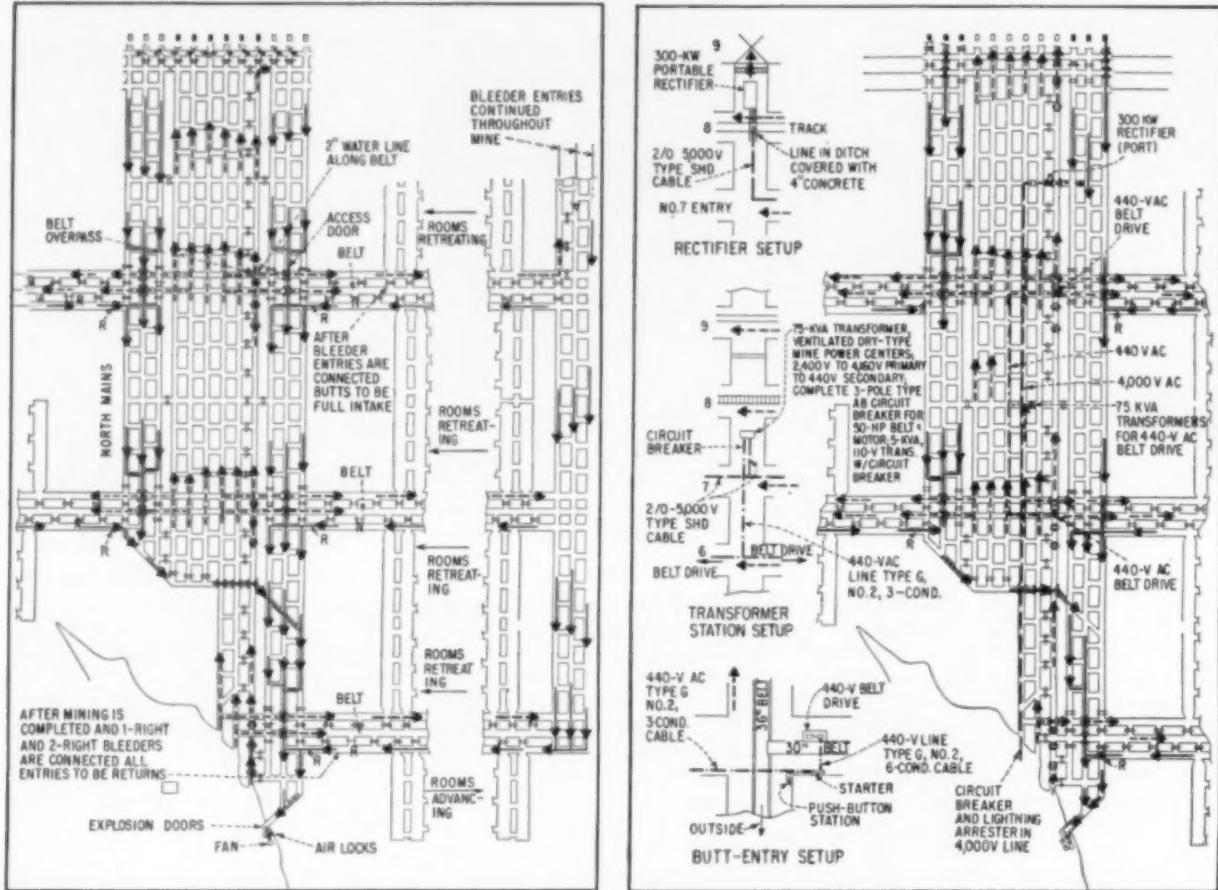
4 Differential Steel man-trip cars, covered type, maximum capacity, 32 men each.

2 6-ton locomotives (1 G.E. and 1 Westinghouse) for hauling men and supply cars.

SECTIONS 2,000 FT DEEP

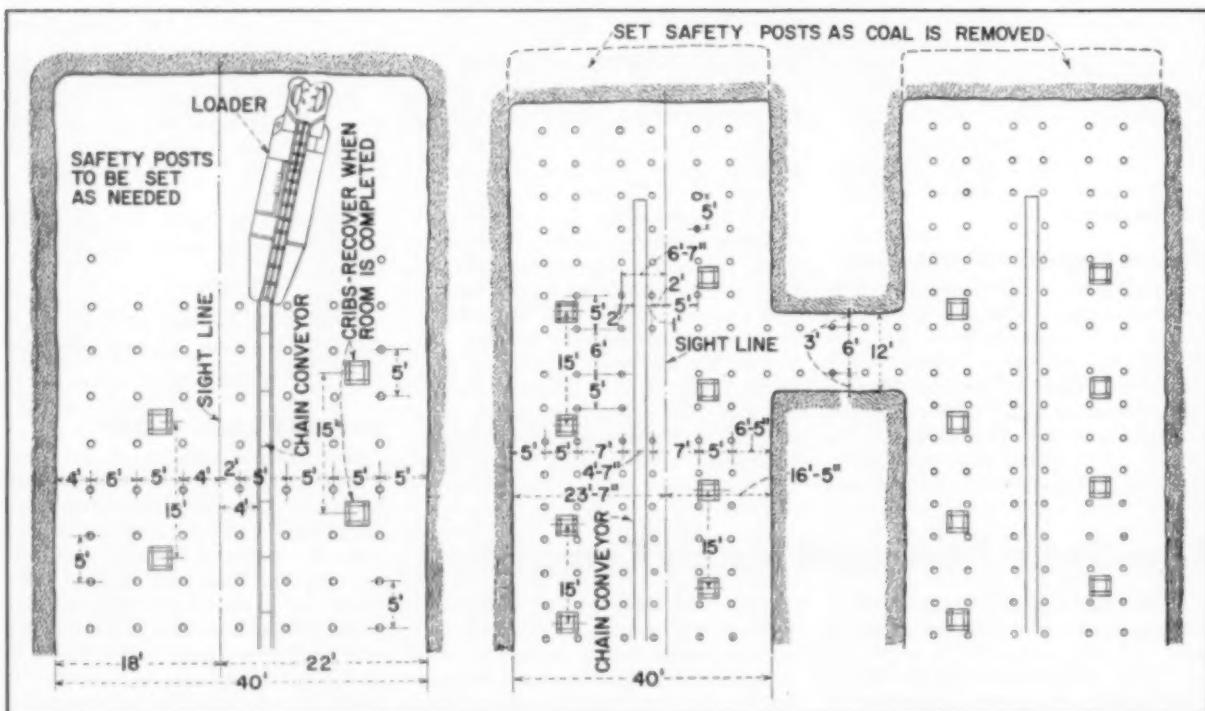
The tracked heading of the main entry is graded to provide a 4-ft height, bottom to mine roof. Drilling top slate or bottom fire clay for shooting is done with air hammers. Supply tracks do not extend along the section belts. These are reversed for carrying men and supplies. Normal maximum length of a section or panel belt is 2,000 ft. However, some will be extended to 3,000 ft to carry to the property line.

The main entry comprises 12 headings 16 ft wide on 50-ft centers, and



BLEEDER HEADINGS are included in No. 8 ventilation.

POWER UNITS are coordinated with ventilating system.



MINIMUM TIMBERING in 40-ft rooms at Valley Camp No. 8 mine. Left is plan for conveyor loaders; right, plan for conventional loaders, in this instance on right side of belt. More timbers must be set where conditions require it.

butt, or section-belt, entries consist of 3 headings 22 ft wide on 50-ft centers, with the belt in the center heading. Panels are worked room-and-pillar and no pillars are extracted. Five loading machines on a section is normal practice, three working the triple-heading entry and two working rooms advancing on the return side.

MACHINES STAY IN PLACE

Instead of working two or more places with each Jeffrey CLR loader, the machine is kept in one place and left idle during undercutting and other face preparation. Shooting is done with permissible explosives. The room sight line is 18 ft from the left rib and the room conveyor is positioned with the edge of the pan line 4 ft to the right of the sight line. Three face men is a normal crew in a 16-ft heading, four in a 22-ft heading, and five in a 40-ft room. The usual mine shift consists of 50 face men and 12 day men.

TIMBERING PLANS FOLLOWED

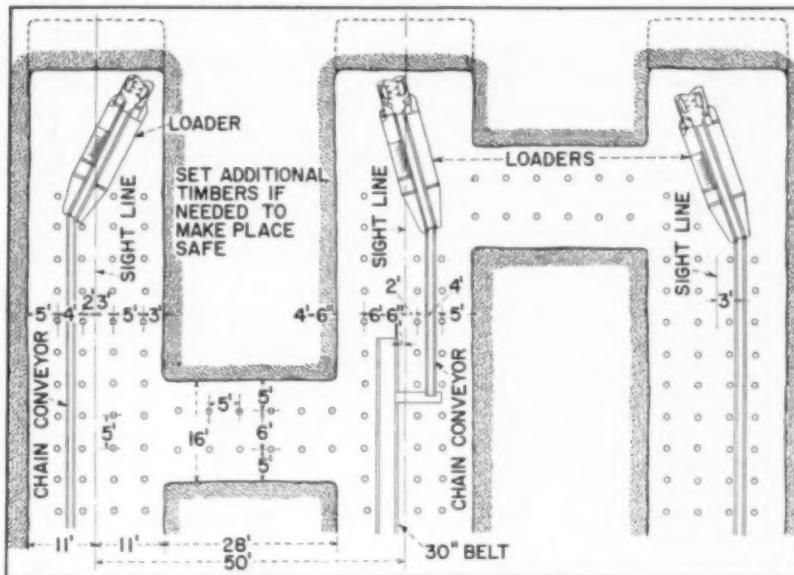
Room timbering consists of posts and cribs set according to a minimum plan. The cribs are recovered as the room is completed. Timbering in butt entries consists of posts only and also follows the minimum plan. These plans, shown in the accompanying drawings, include ones for rooms worked by the two general types of loaders. Jeffrey 61CLR's are worked in one place only while crawler loaders work in multiple room setups. However, at the present time, the short-walls remain in each working place on crawler-loader sections.

Ventilation is supplied by an 8-ft Aerodyne fan near the belt portal and operated exhausting. The six center headings of the main entry are intakes and the three headings on each side are returns. On the butt, or section, belt entries, the center heading and the heading farthest inby are intakes, with the other heading the return. The standard ventilation plan calls for bleeder entries across the back ends of the panels.

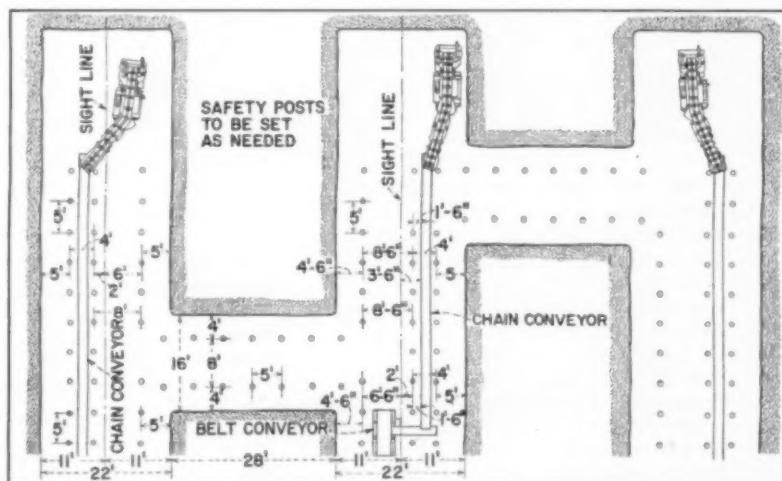
POWER UNITS UNDERGROUND

Belt conveyors are operated by 440-v AC power supplied by two transformer load centers, with all other underground machinery operating on 275-v DC supplied by two portable mercury-arc-rectifier substations, both underground. The power supply at 4,400 v is carried underground from the main portal by a 3-conductor No. 2/0 Hazaprene neoprene-sheath Type SHD cable lying on the mine bottom in an intake aircourse. This cable includes three No. 4 ground wires.

The reduction to 440 v is made by two Westinghouse Type AVR 3-phase



MINIMUM TIMBERING in butt-entry development with conveyor loaders.



MINIMUM TIMBERING in room entries driven by conventional loaders.

112-kva power centers. These have Class B insulation, are air cooled and include grounding transformers and ground resistors. Rectifiers are 300-kw ignitron type, one by Westinghouse, the other by General Electric.

The drive of the 36-in 5,400-ft main entry belt conveyor is immediately inside the portal and 600 ft from the belt discharge at the top of the storage bins. A Louis-Allis 125-hp 440-v, 1,185-rpm motor and DeLaval speed reducer drive the conveyor. The magnetic starter is an Ensign-Clark unit furnished by Ensign Electrical & Mfg. Co.

STEEL BUILDINGS ON SURFACE

Two Armco Steelox buildings have been erected between the supply track portal and belt portal. One building

houses a temporary supply room and the other a lamproom, waiting room and mine foremen's office. Lamproom equipment consists of 200 Edison cap lamps and self-service charging racks.

A central shop, also Armco Steelox construction, has been erected 250 ft from the supply-track portal. Dimensions are 40x80 ft, 14 ft to the eaves, including 2 ft of concrete foundation extending above the floor line.

Where the crushed-coal conveyor crosses U. S. 60 the coal company operates a gasoline station and retail store. An office building for the Southern Div. of the company is projected for construction across the highway from the service station and store. At present the division offices are at Ward, up Kellys Creek from Shrewsbury.

The 50 Biggest Mines in 1954

THE NATION'S 50 LEADING COAL MINES, all bituminous, produced 73,439,443 tons in 1954, or 18.7% of the estimated bituminous total, according to the annual study prepared by J. R. Forsythe, general manager, *Keystone Coal Buyers Manual*, a *Coal Age* Affiliate. Their 1954 output compares to 80,289,858 tons, or 17.8% of the total, produced by the 50 largest in 1953. During 1954, 49 mines produced over 1 million tons, as compared to 76 in 1953.

Of 1954's top mines, 34 are commercial operations, each of which is equipped with a mechanical cleaning plant, as are 14 of the 16 captive mines. Some 20 of the 34 commercial mines increased their production over 1953, in contrast to the industry loss of 13.7%, thus once more emphasizing the importance of mechanized mining and mechanical cleaning. Twenty-one of the 50 mines were opened during or since 1945, including the top five producers.

| COMPANY | NAME OF MINE | STATE | PRODUCTION | | |
|--|-----------------------|--------|------------------------|--------------------|------------------------|
| | | | 1954 | 1953 | 1945 |
| 1. U. S. Steel Corp. | *Robena (c) | Pa. | 4,102,938 | 4,439,439 | 1,557,778 ¹ |
| 2. Peabody Coal Co. | *Peabody No. 10 | Ill. | 2,645,923 | 2,357,610 | New, 1952 |
| 3. Clinchfield Coal Corp. | *Moss (pa) | Va. | 2,178,595 | 2,570,229 | New, 1947 |
| 4. Mathies Coal Co. | *Mathies | Pa. | 2,154,454 | 2,101,837 | 59,992 ² |
| 5. Pocahontas Fuel Co., Inc. | *Itmann | W. Va. | 2,144,046 | 1,797,566 | New, 1949 |
| 6. Jones & Laughlin Steel Corp. | Vesta No. 5 (c) | Pa. | 2,084,877 | 2,110,915 | 1,243,827 |
| 7. Peabody Coal Co. | *Peabody No. 17 | Ill. | 1,980,719 | 2,283,494 | New, 1949 |
| 8. Hanna Coal Co., Div., Pitts. Consol. | Georgetown No. 12 (s) | Ohio | 1,954,232 | 2,428,773 | 1,942,055 |
| 9. Homestead Coal Co. | Hcmestead (s) | Ky. | 1,952,064 | 1,862,802 | 456,337 ³ |
| 10. Eastern Gas & Fuel Assoc. | Kopperston 1 & 2 | W. Va. | 1,947,894 | 1,895,866 | 1,173,915 |
| 11. Jones & Laughlin Steel Corp. | Vesta No. 4 (c) | Pa. | 1,916,512 | 2,034,037 | 1,423,574 |
| 12. U. S. Steel Corp. | *Lynch No. 32 (c) | Ky. E. | 1,774,582 | 1,796,738 | New, 1951 |
| 13. Eastern Gas & Fuel Assoc. | Federal No. 1 | W. Va. | 1,738,038 | 2,075,547 | 1,692,509 |
| 14. Freeman Coal Mining Corp. | *Crown | Ill. | 1,600,718 | 1,642,160 | New, 1951 |
| 15. Bethlehem Mines Corp. | *Idamay No. 44 (c) | W. Va. | 1,599,789 | 1,974,688 | New, 1946 |
| 16. U. S. Steel Corp. | Gary No. 2 (c) | W. Va. | 1,581,272 | 1,598,871 | 1,711,444 |
| 17. Chicago, Wilmington & Franklin Coal Co. | *Orient No. 3 | Ill. | 1,579,296 | 1,369,093 | New, 1950 |
| 18. Old Ben Coal Corp. | *No. 9 | Ill. | 1,433,520 | 1,214,374 | 162,006 ⁴ |
| 19. Inland Steel Co. | Price (c) | Ky. E. | 1,433,130 | 1,446,901 | 1,430,000 ⁵ |
| 20. Christopher Coal Co., Div. Pitts. Consol. | Arkwright No. 1 | W. Va. | 1,376,133 | 1,243,883 | 547,550 ⁶ |
| 21. Hanna Coal Co., Div. Pitts. Consol. | Bradford No. 1 (s) | Ohio | 1,320,791 | 1,284,055 | 343,801 ⁷ |
| 22. Union Colliery Co. | *New Kathleen (c) | Ill. | 1,304,153 | 1,276,527 | New, 1946 |
| 23. Pocahontas Fuel Co., Inc. | Bishop | W. Va. | 1,299,157 | 1,341,078 | 1,243,800 |
| 24. Christopher Coal Co., Div. Pitts. Consol. | Osage No. 3 | W. Va. | 1,289,798 | 1,136,953 | 996,949 |
| 25. Truax-Traer Coal Co. | Red Ember (s) | Ill. | 1,277,123 | 1,368,088 | 1,349,521 |
| 26. Bethlehem Mines Corp. | No. 41 (c) | W. Va. | 1,248,061 | 1,629,499 | 1,802,669 |
| 27. Duquesne Light Co. | Warwick (c) | Pa. | 1,246,285 | 1,366,789 | 861,930 |
| 28. Compass Coal Co. | *Compass | W. Va. | 1,239,009 | 1,323,393 | New, 1949 |
| 29. West Kentucky Coal Co. | *Pleasant View | Ky. W. | 1,200,323 | 1,206,094 | New, 1949 |
| 30. Consolidation Coal Co. (W. Va.), Div. Pitts. Consol. | *Williams | W. Va. | 1,196,944 | 702,493 | New, 1947 |
| 31. Powhatan Mining Co. | No. 3 | Ohio | 1,179,835 | 1,152,272 | 942,142 ⁸ |
| 32. Minera Coal Co. | *Fies | Ky. W. | 1,172,680 | 1,165,975 | New, 1949 |
| 33. U. S. Steel Corp. | Lynch 30 & 31 (c) | Ky. E. | 1,171,745 | 1,082,099 | 1,878,146 |
| 34. Jamison Coal & Coke Co. | No. 9 | W. Va. | 1,167,393 ⁹ | 1,048,710 | 551,370 |
| 35. Tennessee Coal & Iron Div. U. S. Steel. | *Concord (c) | Ala. | 1,151,274 | 1,375,541 | New, 1947 |
| 36. Pond Creek Pocahontas Co. | No. 1 | W. Va. | 1,133,573 | 1,108,491 | 964,133 |
| 37. Blue Diamond Coal Co. | *Leatherwood No. 1 | Ky. E. | 1,123,219 | 983,422 | New, 1945 |
| 38. Eastern Gas & Fuel Assoc. | Keystone | W. Va. | 1,112,504 | 1,127,021 | 1,218,086 |
| 39. Enos Coal Mining Co. | Enos (s) | Ind. | 1,106,325 | 1,274,711 | 1,314,831 |
| 40. Northwestern Improvement Co. | Rosebud (c) (s) | Mont. | 1,083,815 | 1,421,140 | 2,555,207 |
| 41. Cadiz Mining Co. | Cadiz No. 15 (s) | Ohio | 1,070,969 | 942,141 | 453,534 ¹⁰ |
| 42. West Kentucky Coal Co. | *East Diamond | Ky. W. | 1,050,515 | 1,089,206 | New, 1945 |
| 43. Powellton Coal Co. | Jane Ann | W. Va. | 1,038,791 | 1,106,452 | 610,000 |
| 44. U. S. Steel Corp. | Bridgeport (c) | Pa. | 1,038,309 | 1,277,426 | 1,134,921 |
| 45. Truax-Traer Coal Co. | Burning Star (pa) | Ill. | 1,018,289 | 943,219 | 1,332,965 |
| 46. Sunnyhill Coal Co. | *Sunnyhill (s) | Ohio | 1,018,000 | 1,010,000 | New, 1947 |
| 47. Pocahontas Fuel Co. | Amonate | W. Va. | 1,004,422 | 447,717 | 1,242,924 |
| 48. Consolidation Coal Co. (W. Va.), Div. Pitts. Consol. | No. 32 | W. Va. | 1,004,371 | 1,297,460 | 1,191,348 |
| 49. Central Ohio Coal Co. | *Muskingum (c) (s) | Ohio | 1,001,000 | New, 1953 | New, 1953 |
| 50. Alabama Power Co. | Gorgas (c) | Ala. | 992,038 | 956,150 | 274,512 |
| TOTAL OUTPUT, 50 Mines | | | 73,439,443 | 73,688,945 | 35,663,776 |
| U. S. TOTAL, Bituminous and Lignite | | | 392,000,000 | 457,290,449 | 577,617,327 |

SYMBOLS: (c) Captive mines. (s) Strip mines. (pa) Part of output from sugar mining. ¹ New mines in or since 1945. ² Ronoco-Robena Mines, Robena under Development. ³ Pittsburgh Coal Co., New, 1945. ⁴ Deep mine now exhausted. ⁵ Mine under development, opened in 1945. ⁶ Wheel-

wright mine, now part of Price. ⁷ Consolidation Coal Co. ⁸ Bradford Collieries Corp. ⁹ Rail & River Coal Co. ¹⁰ Company acquired by Pittsburgh Consolidation Coal Co., Oct. 1954. ¹¹ Miles Bros., Inc.

Do you know enough about the new tax law? Check yourself against this . . .

Tax Law Quiz

ALTHOUGH YOU'VE GOT an extra month to file your 1954 personal tax return, that extra month won't help if you merely wait that much longer to get started. And incidentally, that extra month is not for your business if it is a corporation.

There are literally thousands of technical changes in the revised law, and their effective dates vary. You may be out of pocket, both as an individual and a business man, if you are not familiar with the revisions that apply to you—either by overpaying or because you slip up on some requirement and become liable for assessments, in-

terest and penalties. After all, paying taxes is bad enough for most of us without something like that.

This little quiz game will help you check your knowledge of some of the important changes in the law. Check each of the 10 statements "True" or "False", and then turn to p 83 for the correct answers. Unless you're 100% perfect on the points affecting you, you'd better call on your tax adviser at once or go back and restudy the subject. This quiz was prepared by the American Institute of Accountants, the national professional society of certified public accountants.

TRUE 1. You found a bargain in used truck. It had been driven only 500 mi and you expect it to last you some years. Under the new tax law, you can deduct your depreciation much faster than under the old law.

TRUE 2. You're proud of the fact your 17-yr-old son got a summer job and earned \$1,000.
 FALSE But you are sorry he can no longer be claimed as dependent since his earnings total more than \$600 for the year.

TRUE 3. You, your two brothers and your uncle have incorporated the family business. All of you would like to modernize your plant, but have hesitated to retain earnings to do so, because of the difficulty of proving the accumulation "reasonable" and because of the penalty tax levied if you did not succeed. Now, under the new tax law, it will be easier to prove an accumulation reasonable.

TRUE 4. You and five other men formed a corporation in the fall of 1954 (after enactment of the new tax law). There were organizational expenses of \$5,000 incurred prior to the date of the charter. Since their useful life cannot be precisely determined until such a time as the corporation may liquidate, these expenses cannot be amortized for tax purposes by the corporation.

TRUE 5. You are the sole proprietor of your business, married and have one child. This year your business has a profit of \$40,000. If you report as an individual, making a joint return and taking three exemptions and the standard deduction, your profit (after tax of \$13,036) will be \$26,964. After living expenses of \$12,220, you will have left \$14,744. But now you can report as a corporation and have more money available than if you reported as an individual.

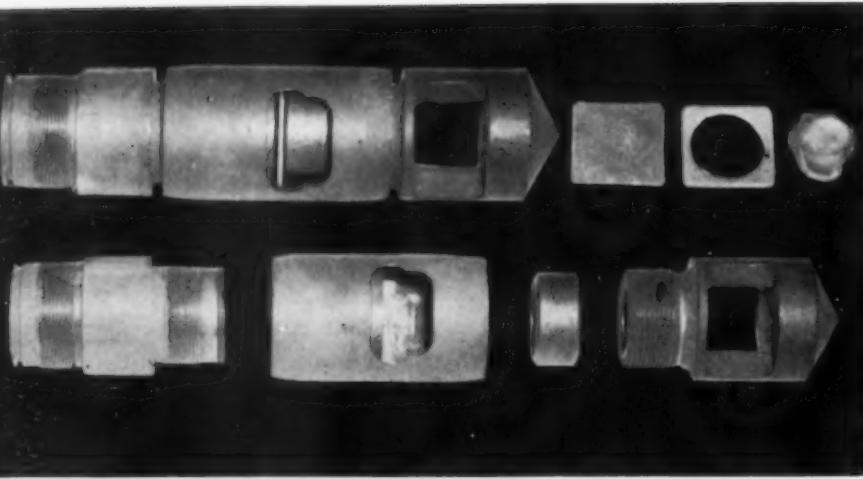
TRUE 6. Two years ago your business was good, but since that time conditions in your area have deteriorated. This year you probably will sustain some loss. Of course you can carry your loss back a year, but you just broke even last year. You can also carry it forward, spreading the loss over 5 yr. But there is no immediate relief for you.

TRUE 7. Your company purchases new mining equipment costing \$2 million. Accelerated depreciation will be taken because this new option always means a saving.

TRUE 8. You are a bachelor. Your father died last year leaving your mother to be supported by you. You feel she would be happier staying on in her old home, rather than coming to live with you. But since you are single, you will be denied the tax benefits available to a "head of a household."

TRUE 9. It has been an expensive year for you. You had some fancy dental work, your wife had an operation, your 17-yr-old daughter caught an infection, and your grade-school son suffered a complicated fracture of his arm. Altogether you paid medical, dental and hospital bills totaling \$3,000, and made an outlay of \$400 for drugs and medicines. But fortunately you can deduct \$3,160 of these expenses from your adjusted gross income of \$6,000.

TRUE 10. One of your employees dies this year, leaving his wife with two small children to support. She has some income of her own and the firm will pay his full salary to her for this year and next. But her income after taxes will be lower for now she will be filing a separate return and not a joint one.



IMPROVED SHOOTING HEAD. ready to be shot, (top, left) features simplicity and ruggedness. Component parts include shear plate (top row, left), shear plate after shooting, spent plug, adapter (lower, left), body, shear ring, shooting cap.

Better Air Breaking

How better face preparation was achieved at Hanna Coal by redesigning air-breaking unit to meet mining needs.

By A. F. MEGER
Maintenance Engineer
Hanna Coal Co.
St. Clairsville, Ohio

BETTER COAL BREAKING, greater safety, more efficient use of compressed air and lower maintenance costs are among the top benefits resulting from a continuing co-operative program between operating officials, engineers and manufacturers' representatives at the Hanna Coal Co., St. Clairsville, Ohio.

The Willow Grove mine had been using three portable compressors to supplement other methods of shooting coal, when the decision was made to change over entirely to air with stationary units. Olin Industries furnished the required equipment, which was the Armstrong stationary compressors combined with the Armstrong Air-Breaker discharge assembly.

Without a doubt, the simple and rugged shear-plate discharge assembly is the greatest advance in coal shooting in a long time. To improve rock fracture and coal movement in our 11-ft cuts, we had to increase shooting pressures from the original 7,000- to 8,000-psi range to a 9,000- to 9,500-psi range. The pressure increase was easily obtained by using heavier shear plates in the discharge assembly.

CONTROLLING PRESSURE

To stabilize breaking pressures within the 9,000- to 9,500-psi range, a number of low-carbon steels supplied by various manufacturers were used to make shear plates. Samples, containing about 0.15 carbon, were heated and quenched at 1,650 deg F, then drawn at 400, 600, 800 and 1,000 F. Although some small changes in hardnesses were obtained under the various treatments, shearing pressures did not change correspondingly.

Failure of the heat treating to produce the desired changes in shearing strength led to the conclusion that a thickness tolerance of about 0.003 in on 13-gage shear plates was the most important factor in keeping shearing pressures within the 500-psi limit desired. Tests indicated that a thickness variation of 0.006 to 0.008 in would result in shooting pressures varying by as much as 1,200 psi.

CONSERVING AIR

After solving the problem of controlling breaking pressures, attention was focused on the possibility of conserving compressed air. A series of careful tests were made to determine how small an amount the shooting valve had to be cracked before the shell-loading time was affected. Management felt that considerable compressed air could be saved if the breaking were done with the valve opened

as little as possible. Results of the tests indicated that there was no difference in loading and breaking time with the valve opened two full turns or with it cracked one-quarter turn.

The loss in compressed air, which takes place while a man is closing a valve two turns as compared to a quarter turn, may appear to be insignificant. But by adopting the valve cracking idea along with other air conservation measures it was possible to break coal with one less compressor than originally believed necessary for the mine.

IMPROVING THE HEAD

As a result of the increase in coal-breaking pressures, shooting heads were short lived. Hanna engineers, in co-operation with Olin Industries, designed, built and tested six different heads before a suitable unit was developed. In over a year of operation none of the new-design heads has swelled, cracked or broken. Previously, the heads lasted about 2 wk.

We learned that flying shells were all but eliminated except when they were used improperly such as in shooting on the solid or trying to move too much coal. The shell normally moves out about 10 ft and rests on the loose coal where the shotfirer can reload with ease.

To explore the possibility of fabricating, to lower machining costs, some heads were assembled by welding component parts and then heat-treating. These fabricated units proved to be as good as those from solid stock.

Tests also were conducted to determine how much restriction of discharge openings could be tolerated before coal breaking would be affected. There was no significant difference in breaking effectiveness when the shell throat was restricted to 1 1/4-in diameter. But when it was reduced to 1 1/8-in diameter or less, there was a definite loss of initial shock and a corresponding increase in the quantity of dust blown into suspension. This demonstrated that better coal breaking could be obtained by providing as much clearance as possible for air release.

Three types of steel, 4340, 4150 and 9840, were used in the experimental manufacturing of heads and all stood up equally well. Varying hardnesses were tried from 32 to 45 Rockwell C and a range of 38 to 42 was found to be best for long life.

As a result of the tests of various types of heads, it was concluded that two-port heads with as much clearance as possible for air release was the proper design.

To use the new two-port head even

more effectively, greater shell volume was needed. A 160-in shell containing 560 cu in of compressed air was substituted for the original 94-in (329 cu in) and 128-in (448 cu in) units. These larger-capacity shells handled the breaking job much more effectively. Experimental work in shell design was discontinued at this point when the Willow Grove mine closed, but all the possibilities had not been exhausted. For example, it was felt that further improvement would be possible by making the shell 3 ft shorter and increasing the diameter to maintain the same volume. Air would travel a shorter distance before expending its energy and therefore

would be more effective in breaking coal.

Success in eliminating large pieces of rock at the preparation plant plus improved loadability underground demonstrated the value of spending time, engineering talent and money to improve equipment and develop new designs. While working on the problem, the importance of co-operation between operating personnel, engineers and manufacturer was again proven to be of vital importance in making the experiments and improvements possible.

Our work was done under the direction of Hanna's chief engineer, Andrew Hyslop, Jr. A great deal of

credit for the rapid improvement in our air shooting goes to John Zitko, who was assistant superintendent at Willow Grove and is now superintendent at the new Glen Castle No. 6 mine. His practical experience in underground coal preparation, coupled with an insatiable curiosity and absolute refusal to accept "no" for an answer, actually pushed us into the present phase of air-breaking at the Glen Castle mine. Olin Industries was ably represented by Edward Filstrup, the engineer responsible for much of the compressor and shell design of the Armstrong Air-Breaker, which we had been using successfully for a number of years.

Tax Quiz Answers

Here's how the new tax law answers the questions on p 81

1. FALSE—The revised faster rates for depreciation apply only to NEW, not used, equipment.

2. FALSE—A child under 19 may be claimed as a dependent, regardless of his earnings, if you furnish more than half of his support. Your son, too, must file a return and may claim \$600 exemption when he does so.

3. TRUE—The new law allows a corporation to accumulate up to \$60,000 of earnings (total for all years) without being exposed to the penalty. Then, if there is an unreasonable accumulation, the penalty will apply only to that part which is excessive. Furthermore, it is up to the Internal Revenue Service to prove that the amount is excessive.

4. FALSE—The new tax law now allows such organizational expenses to be amortized over a period of not less than 60 mo, beginning with the month in which the corporation is first active in business.

5. TRUE—If you reported as a corporation, as is now permitted, and drew a salary of \$15,000 for which you filed a joint return with three exemptions and the standard deduction, your individual tax would be \$2,780, leaving you for living expenses the same amount of \$12,220. Your profit of \$40,000 less your salary of \$15,000 leaves \$25,000, on which the corporation tax would be only 30%, or \$7,500. Thus, by reporting as a corporation, you would have \$17,500, or \$3,000 more than if you had reported as an individual. But if you elect to report as a corporation you must do so every year from now on unless there is a 20% change in ownership of the business. Note also that earnings kept in the business may later be subject to income tax as dividends or capital gains. And remember, corporations must file by March 15.

6. FALSE—The revised law permits you to carry your loss back 2 yr instead of 1, and you can claim a cash refund for taxes you paid 2 yr ago.

7. FALSE—In certain cases it may be disadvantageous to accelerate depreciation. These newly available depreciation options are worth looking into because under usual

conditions they can provide many corporations with an immediate or long-term benefit. But there are exceptions. Stop, look—and consult your tax advisor—before you reach a final decision.

8. FALSE—The law has been liberalized and as long as you provide more than half your mother's support and more than half the cost of maintaining her household, you can claim status as head of household even though she does not live under your roof.

9. TRUE—The maximum medical and dental deduction has been raised to \$2,500 per exemption, up to a total of \$10,000 for a head of household or on a joint return. But you can include your outlay for drugs and medicines only to the extent it exceeds 1% of your adjusted gross income, and you must subtract 3% (formerly 5%) of your adjusted gross income from your dental, medical and hospital expenses, plus the includable drugs and medicines. So \$340 of your bill for drugs and medicines can be counted, making \$3,340 your total for medical expenses, of which \$180 (3% of \$6,000) is not deductible and \$3,160 is deductible.

10. FALSE—A taxpayer left with a dependent child after death of husband or wife is considered married for the entire year of the death and may file a joint return for the year of the death. Furthermore, the survivor, if she remains unmarried and supports her children in her home, may continue the privilege of income splitting for 2 yr after the year of the death. This means she will be taxed at the rate which applies to half the sum of her total income, the same as on a joint return for husband and wife. Moreover, \$5,000 of her deceased husband's salary is classed as a death benefit and is tax-free.

NOTE—The new tax provisions are explained above as they apply to taxpayers reporting for the calendar year on a cash basis. Those using a different fiscal year, or reporting on the accrual basis, should check the official instructions to see how they are affected.

In all answers it is assumed that transactions are made in good faith and that no special circumstances exist which would alter the effect.



BACK FOR ANOTHER HITCH, this coal loader has had various parts restored by metallizing, such as the lifting jack, indicated by H. J. Lang, of Industrial Electric of Washington, Inc., Washington, Pa., which handled the job on contract.

Metallizing in Maintenance

Where it can be used, what it does and how it saves

By D. A. WATSON

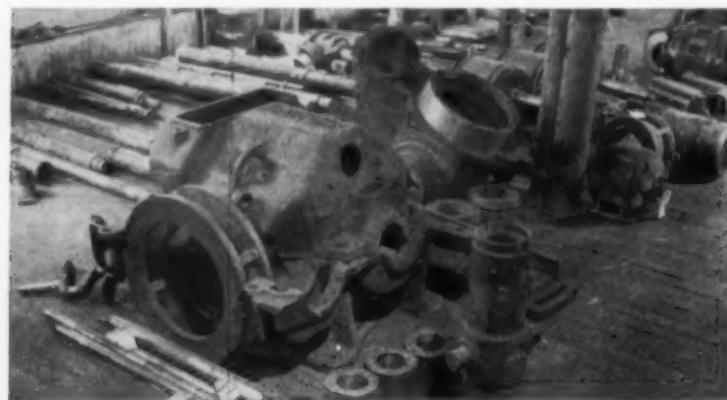
Metallizing Engineering Co., Inc.
Westbury, L. I., N. Y.

HOW CAN METALLIZING help the coal-mine operator with his maintenance problems? Where can metallizing save and where is its use of doubtful or no value? Experience and a knowledge of what metallizing is provide the answers—and these answers can yield handsome dividends through prolonging machine life and reducing down time.

A sliding or rotating machine element part may be damaged suffi-

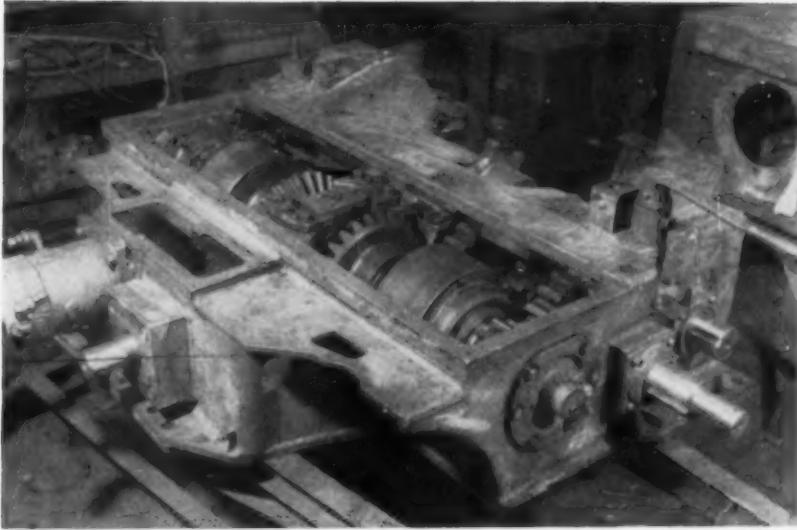
ciently to require repair or replacement in two major ways. These are, first, ordinary wear or abrasion and, second—and to a lesser extent—corrosion. Occasionally, however, these may be combined in a manner which will compound the maintenance problem for the unhappy supervisor faced with such a condition. The average coal mine, with its unavoidable dust, dirt and either acid or alkaline moisture, faces problems far greater than most other industries. A pump piston or rod handling clean neutral water for a textile or paper mill might run for years without trouble. In mining, life may be only a few weeks or less.

Attaining the goal of more tons per shift, thereby getting the maximum return for wage outlays, naturally involves a high degree of mechanization with heavier, speedier and more efficient mechanical operating equipment. Equally important, it also involves keeping the equipment producing longer between breakdown or general overhaul, as well as speed in getting it back to work when these interruptions do occur. It is here that modern metallizing has come to play an important role. Numerous mines have their own complete metallizing installations while others rely on the services of a nearby contract shop. The savings are substantial, this in spite of the fact that most of the 6,000 active metallizing users do not



METALLIZING VERSATILITY is shown by this lineup of parts waiting to be salvaged. The photo at the right was taken in the same shop 2 days after the one at the left.





RESTORED COAL-LOADER TRANSMISSION includes a number of metallized parts, as described in the accompanying article.

realize 10% of the potential of their investment.

WHAT METALLIZING IS

Gaining understanding of the basic characteristics of a sprayed metal coating is not at all difficult, and with the understanding it is equally easy to decide if the proposed job is practical for metallizing and, if so, what metal and procedure should be used. Analysis of sprayed material shows it to be, with one exception, almost identical with that of the original wire used. The exception is a very slight increase in oxide content resulting from the use of oxygen and compressed air. The physical characteristics of the deposited metal do change rather radically and this leads to both advantage and disadvantage in use.

Speaking in a general sense—again there are some exceptions—a metallized coating, compared to cast, drawn, rolled or extruded metal, is more brittle, harder and less dense by about 5 to 10%. Any metal may be applied over any other, so frequently a mild-steel part is coated with a harder metal: bronze, stainless steel, monel, etc. This, plus the unique lubricant-holding properties of the sprayed metal, often make a salvaged part far superior to a new replacement—at a fraction of the cost. It is common for buyers of new parts to metallize them before installation, and for manufacturers of heavy machinery to use the process on their production lines. Since the metal goes on almost cold there is no danger of heat crystallization or distortion.

The manufacturers of metallizing equipment are the first to warn away

from borderline work. Examples are parts subject to point or edge impact, such as, cutting faces or gear teeth. Also, a part worn to such an extent that it requires additional strength would not be suitable for metallizing. There seems to be no limit as to size or pressure on bearings, journals, rolls or rams. The potential is so great that there is no need to recommend the questionable or unproven use. Corrosion protection, primarily the application of pure zinc or aluminum to structural steel, bridges, water tanks, etc., is practically a field in itself and will not be covered in this article.

PROVED IN COAL

As examples of some of the things metallizing can do in coal, we can draw on the experience of a contract shop. This shop, Industrial Electric of Washington, Inc., Washington, Pa., is headed by H. J. Lang. Mr. Lang set up 5 yr ago as an electric motor repair shop with four employees. He put in metallizing, along with machinery to handle heavy work, and now has 23 employees working two shifts. The shop frequently works around the clock when a real emergency arises. The type of business has changed to such an extent that now over 80% of it is metallizing, and of this, 60% is directly for the mines. The work turned out is typical of jobs done regularly either by contract shops or mines with their own equipment.

The lift, elevating and swing jacks on the coal-loading machine shown in an accompanying photo have all been salvaged by metallizing, as an example. Formerly, they were discarded when too worn for good serv-

ice. General practice here is to use a hard stainless steel on the pistons and a special aluminum bronze on the I.D. of the cylinders. Management at this mine observes that it is difficult to estimate cash savings but that the sum surely is appreciable.

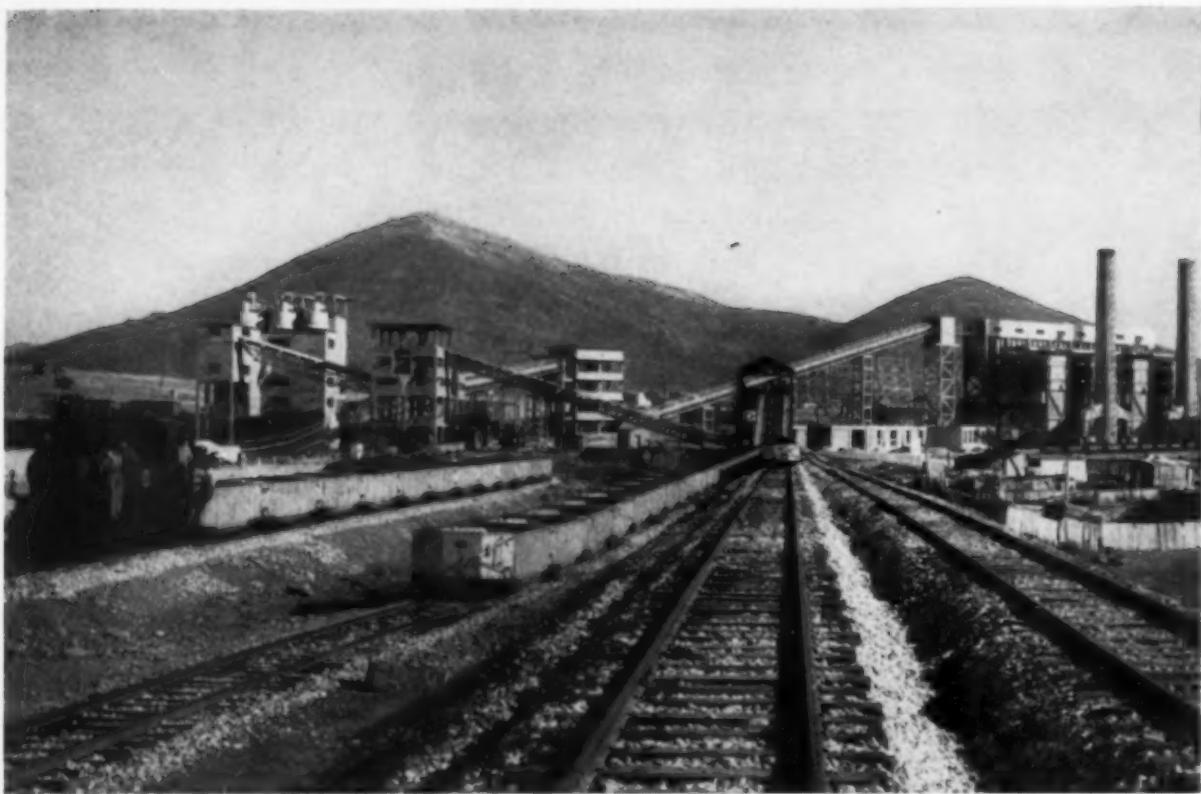
Time is an equally vital element. Making a new part or depending on delivery from the manufacturer is often a lengthy process. The alternative of keeping on hand enough spare parts to achieve the same goal ties up considerable cash. Metal spraying puts the equipment back to work in hours instead of days. Building up the original part is cheaper and the repair often is better because the original mild steel is overlaid with stainless or bronze.

SPRAYING VERSATILE

The coal loader transmission shown in another photo is typical of several sprayed-metal jobs done during one overhaul for another mine. Among other things three shafts were salvaged and are visible in the picture. They are the 12-tooth pinion shaft protruding from the housing (left front); the reversing clutch shaft, nearest one of three on the right; and the truck drive shaft immediately behind the clutch shaft. All were built up with a soft machineable steel at the bearing, seal and bushing fits.

Other examples of work in this shop are booster clutch and transmission shafts from loaders, centrifugal pump shafts, pump plungers and impellers, truck drive shafts for several types of mine equipment, shear jacks and other parts from continuous miners, elevator swing and lift jacks, and spline shafts from cutters. It is worth noting that pump plungers metallized with 18-8 stainless steel in 1944 are still in service 10 yr later. They outlast those with bronze sleeves about 4 to 1. Along these same lines, another mine, because of the extremely corrosive water, had to replace several \$50 plungers each week. Stainless-steel metallized plungers, have now been in service 2 yr without change and are still going strong.

It would be possible to describe and picture an almost infinite variety of metal spray work in mining operations. Two additional illustrations—made in the same shop 2 days apart—show the potential. Some of the parts will be both welded and metallized. The great majority will be metallized only. Many could not have been salvaged at all by any other process and formerly would have been scrapped. Now they are all back in service cheaper, faster and in most instances, better than new.



CENTRAL PLANT with air-cleaning units receives coal from precleaning headhouses at each mine and prepares it for use in the power plant at the right—a new addition to Greece's generating facilities.

Lignite for Greek Power

How two new mines were developed to fuel new power plant, including sinking, mining plan for steeply pitching vein, precleaning headhouses, raw-coal storage, and central plant equipped for air cleaning.



SURFACE PLANT at No. 2 Aliveri includes precleaning headhouse with belt out to car-loading hopper at right.



CAVING FACES provide Aliveri tonnage from thick, highly inclined vein. Yielding steel props and crossbars, supplemented by cribs, provide support.

W. H. LESSER
Mechanical-Electrical Engineer
Pierce Management, Inc.
Scranton, Pa.

DEVELOPMENT of a mining method for efficient recovery of a thick, highly inclined lignite bed with adverse roof and bottom conditions, and design of a preparation system that would yield the maximum in quality for electric power generation at a minimum in cost were twin goals in the recent development of the Aliveri lignite deposit for the Public Power Corp., of Greece.

Two new mines were involved in the project, a part of the Greek Recovery Program sponsored first by ECA and later by FOA. They supply a steam-electric plant on the seacoast 5 mi away. The project is part of a comprehensive program, including several hydro plants and the necessary transmission lines for distributing the power throughout Greece, and was preceded by USGS and USBM studies which indicated that adequate reserves and closeness to the heavy industrial load of Athens warranted development of the Aliveri deposit. The mines are 2½ mi north of Aliveri, on

the island of Euboea, and are 50 mi northeast of Athens.

Included in the Aliveri project, carried through by Pierce Management, Inc., consulting mining engineers and mine managers, of Scranton, was the engineering, equipment procurement, design and construction of two shafts and two slopes, a lignite cleaning plant, two precleaning headhouses, pumping plants, underground and surface haulage systems, substations and electric lines, and the necessary surface buildings.

Operation of two existing slope mines, producing a small tonnage from old mining areas and affording an opportunity to train a key organization for the new mines, also was supervised by Pierce Management. In addition, Pierce Management planned and directed the training of a selected group of Greek engineers in American mine management and engineering in the United States.

CONDITIONS: Thick Seam, Pitch, Bad Top and Bottom

Aliveri lignite has a woody structure with streaks of soft, earthy, carbonaceous material. It contains a large amount of resinous substances, is tough and rubbery, and embodies whole tree trunks in some areas. Color

varies from brown to black. A typical proximate analysis is:

| | Air Dried | As Recd. | Moist. Free | Moist. & Ash Free |
|-------------|-----------|----------|-------------|-------------------|
| Moist. | 10.7 | 35.4 | — | — |
| Vol. Mat. | 45.2 | 32.7 | 50.6 | 61.6 |
| Fixed Carb. | 28.1 | 20.3 | 31.5 | 38.4 |
| Ash | 16.0 | 11.6 | 17.9 | — |
| Btu | 8,040 | 5,820 | 9,000 | 10,970 |

Drilling with Sprague & Henwood equipment indicated in some areas a bed thickness of between 60 and 150 ft on a dip of 50 to 60 deg, and in others 3 to 70 ft on 12 to 22 deg. Clay partings in the seam vary from a streak to 60 ft. The area has been steeply tilted and subjected to complex faulting, and the coal now lies between a marl hanging wall and a clay footwall. Other strata above and below are relatively soft.

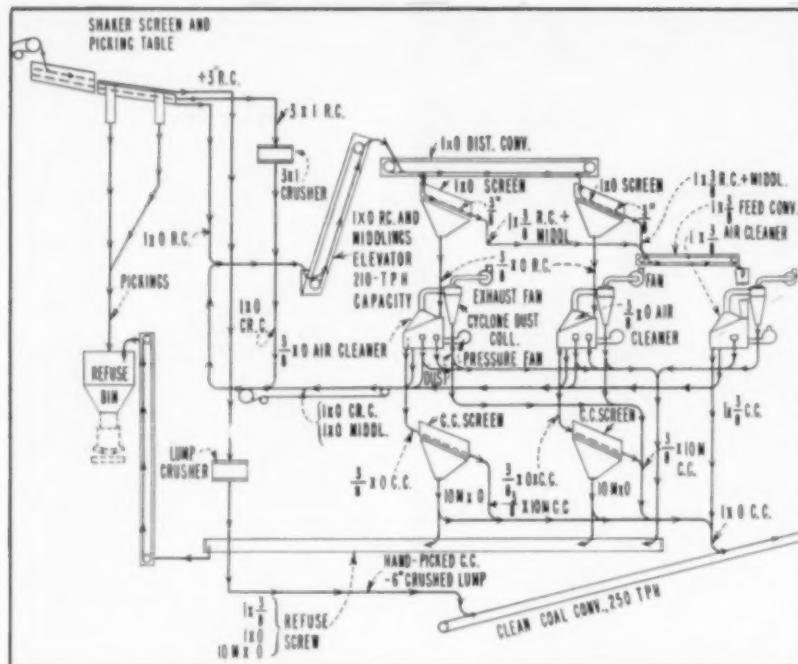
Proved reserves allocated to the Aliveri project total 24,250,000 net tons, making property life, at an annual output of 825,000 tons, 29 yr.

DEVELOPMENT: Shafts, Slopes and Stripping

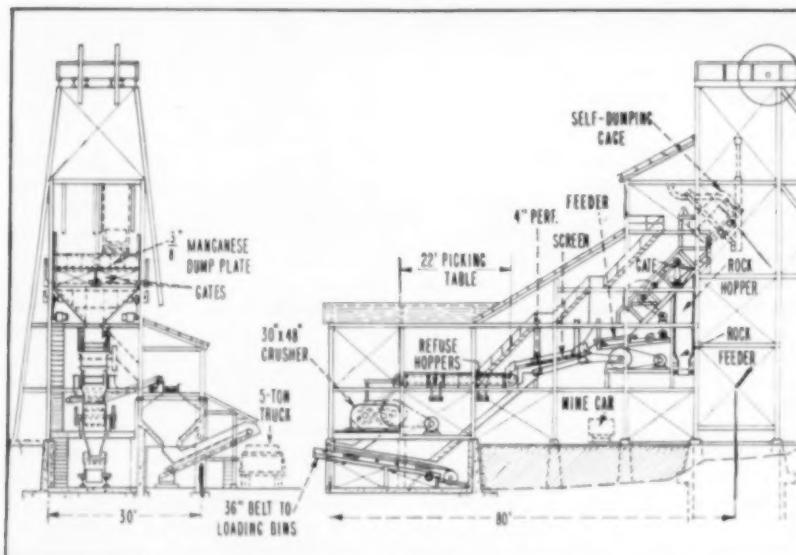
Two circular shafts were sunk to develop No. 1 Aliveri mine, while No. 2 is served by twin slopes. Since, however, developing and organizing underground production under prevailing conditions is necessarily a long process, it was concluded that stripping should be developed to fill in. Fortunately, a suitable body of around 250,000 tons was located between the two mines. The small reserve, however, did not warrant equipment purchase, aside from the limited availability of the equipment in Greece. By renting such as was available, the mine was brought into production. It can turn out 400 to 800 tons per day and will have a life of 2 to 3 yr.

Water Requires Shaft Grouting— Shaft depth at No. 1 Aliveri is 360 ft. Diameter of the hoisting shaft is 17 ft; air shaft, 13 ft. Distance between shafts, both lined with reinforced concrete, is 243 ft. Both shafts were sunk in the limestone under the seam. Connection to the seam is by means of two 800-ft-long circular concrete-lined tunnels through the footwall clays. One serves as haulageway and intake airway to the strike entries. The other is the return. Sinking and tunnel driving were done by Philip Holzman, Germany.

Drilling prior to sinking showed fissures in the limestone filled with clay, and pump tests seemed to forecast only a small quantity of water. The clay filling proved to be impervious, giving a false indication as to the water inflow, and also hampered



PICKING, CRUSHING AND AIR-CLEANING feature flow of coal through Aliveri central preparation plant feeding new Greek power station.



PRECLEANING HEADHOUSES at the two Aliveri mines provide for scalping, handpicking of coarse coal and breaking to fixed top size.

grouting ahead of the work when sinking got under way. Flow near the bottom of the shaft mounted up to 1,000 gpm, and 1,600 gpm was encountered in excavating for the pump room near the shaft bottom.

Most of the water inflow was stopped by concentrating it in an area where one or more pipes could be inserted in the fissure and then grouted. In many instances, the rock was so weak and the inflow so dispersed that the shaft bottom or tunnel

face had to be closed off by a thick concrete stopping, through which holes eventually were drilled into the water-producing fissures. The drilling was done through a pipe embedded in the stopping with an open valve on the outside or at the upper end.

When the drill intersected a clay-filled water-producing fissure, indicated by reddening of the water, it was necessary to drain off a considerable quantity to remove sufficient clay to provide room for the cement grout.

Other special methods sometimes were necessary to seal off the water. On one occasion, it was necessary to place concrete under 200 ft of water to seal off the shaft bottom. This was accomplished by a pipe receiving concrete directly from the mixer on the surface, and with its lower end immersed in the concrete after a water-free channel had been established. On another occasion, after the reinforced pumproom floor failed under the grouting pressure, the room was sealed and filled with water to a hydrostatic head slightly greater than the pressure applied to the lining by the grout.

Grouting equipment consisted of two duplex double-acting compressed-air pumps capable of 1,450 psi, plus high-pressure pipes, armored hose, pressure gages, mixing tank with recirculating pump, and pumping tank. Total cement consumption for all grouting purposes was 42,760 sacks, or 2,350 tons. Total injected as grout was 37,507 sacks; used for bulkheads and stoppings prior to grouting, 5,163 sacks.

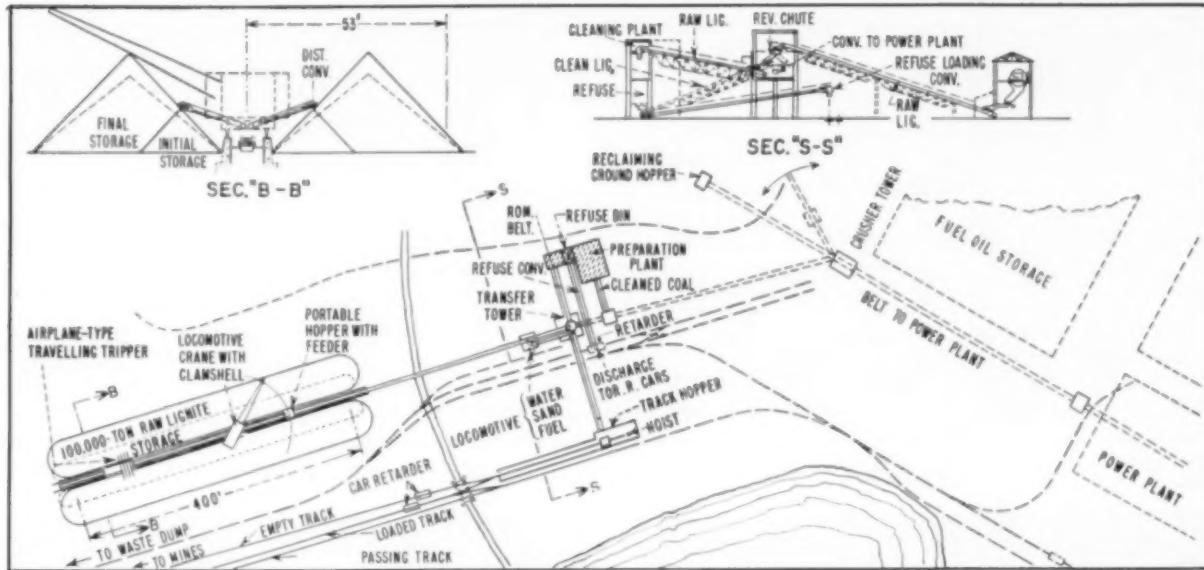
Chemical accelerating agents were mixed with the cement for quick fastening of injection pipes and for stopping small leaks in the concrete. Various organic substances were added to the cement-water mixture for a quick-jelling effect in porous ground. Sand quantity was small.

Hoisting At No. 1 Mine—With a total hoist of the 427 ft and operating in balance with self-dumping cages, the hoisting cycle at No. 1 Aliveri is: dumping, 15 sec; acceleration, 7 sec; deceleration, 10 sec; full-speed running time, 12 sec; total, 44 sec. On this basis, the hoist handles 82 cars per hour. It is a double cylindroconical unit with single-reduction herringbone gear and, with cages, was supplied by Vulcan Iron Works. The motor is a 400-hp 3,000-v 50-cycle AC unit supplied, with controls, by Westinghouse. Hoisting ropes were provided by Westfälische Union, Germany, and feeding, caging and trip-making equipment by The Nolan Co.

Hoisting at No. 2 Mine—Dipping an average of 18 deg, the two slopes for No. 2 Aliveri have now reached a length of more than 1,500 ft. One serves both for hoisting and intake; the other is the return. The hoist was by Siemens-Schuckertwerke, Germany.

ALIVERI MINING: Strike Development, Sublevel Caving

Since most of the lignite is thick and is on a heavy pitch with soft hanging and footwalls, the conclusion was that the sublevel caving system using a wire mat, with a small inter-



HOW RAW-COAL STORAGE is integrated into the surface facilities at the Aliveri central plant.

val between levels, was the best mining method. Main openings to block out the levels are driven on the strike, with the main haulage roads in the marl hanging walls. Blasting off the solid is difficult in the marl, but it is easily center-sheared with a light Eickhoff combination shearing-and-cutting machine. Compressed-air drills, supplied by Consolidated (England) Pneumatic Tool compressors, are used for making shotholes. Mucking in marl or lignite is speeded by a double-drum I-R slusher loader.

Support in all main haulageways and airways is provided by steel arches of the three-piece telescoping type (Bochumer Eisenhutte Heintzmann, Germany). Weighing 43 lb per yd, and with a trough-shaped section, these arches are capable of yielding under excessive pressure without breaking or deforming. The arches are lagged with 3-in.-diameter material for even distribution of pressure.

Plan and cross section of the mining system in a heavy-dip area are shown in accompanying drawings. Working places on sublevels are driven parallel to the strike of the seam. Each is equipped with a hand-loaded Joy-Sullivan chain conveyor discharging to a mother chain running across the seam at right angles to the strike. The mother chain discharges to a raise in the marl hanging wall, which conducts the coal to mine cars in the strike entry.

Chain-conveyor working places are driven 13 ft wide and 7 ft high on 39-ft centers. The interval between sublevels is 12 to 14 ft, leaving 5 to 7 ft of top coal to be mined on the retreat. Raises in the hanging wall

are 12 ft wide and 8 ft high on 200-ft centers. When advancing and retreating, scraper loaders will be used to move the lignite to the chain conveyors in the working places. Hand-held electric drills (Siemens-Schuckertwerke) are used for shotholes in the lignite.

This mining plan was adopted because it makes possible a more complete extraction, thereby avoiding spontaneous combustion of the lignite left in place, which has caused numerous mine fires in past mining.

Since native timber for mine props was difficult to obtain, and rather high in price, Stahlunion Export and Hermann Schwarz telescoping steel props were adopted as the standard support at the mine working faces. Each prop weighs 160 lb and has a capacity of 40 tons. At 40 tons, the props yield $\frac{1}{2}$ in and, under these conditions, are not overstrained as the load increases. In addition to the steel props, wooden chocks with mechanical releases are used as supports along those caving faces where the roof is soft and subject to heavy pressure.

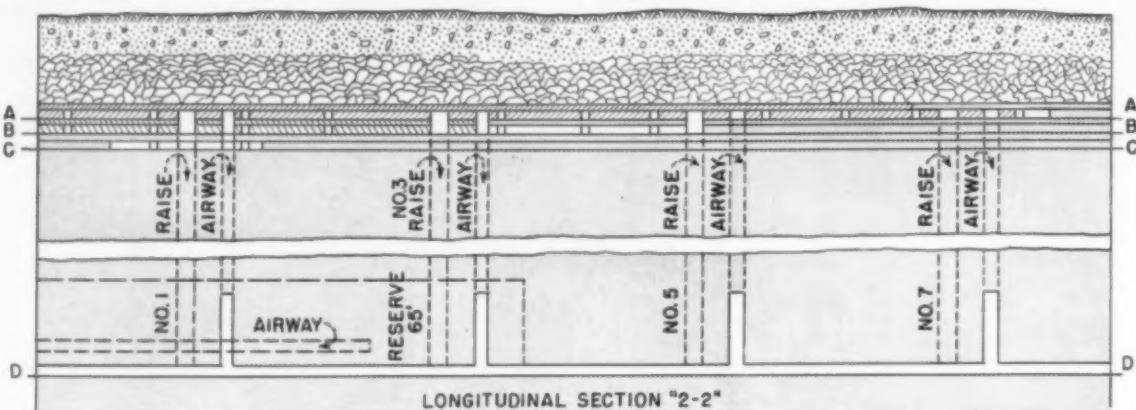
BEHIND THE FACE: Power, Haulage, Pumping, Ventilation

Primary Power—Provided for both mines and surface facilities by main substation at No. 1 Aliveri, with satellite station at No. 2 Aliveri. No. 1 station, three 1,000-kva single-phase transformers, 15,000/3,000 v, plus three 167-kva single-phase transformers, 15,000/380-220 v, for small motors and lighting. No. 2 station, three 200-kva single-phase transformers, 3,000/380-220 v. The substations are Siemens-Schuckertwerke, with trans-

formers by A. Pellizeri & Figli, Italy.

Mine Power—Both AC at 3,000 v for pumping and auxiliary transformer supply, 380 v for operating chain conveyors in the mining area, and 125 v for the electric coal drills, plus DC at 250 to 275 v for haulage, are provided from surface units, DC by 300-kw Pellizeri & Figli m-g sets in the surface hoist house at each mine. Two 3-conductor armored cables suspended in the main hoisting shaft conduct 3,000 v underground at No. 1 Aliveri. One supplies the pumping plant and the other a substation—three 167-kva dry-type transformers, single phase, 3,000/380 v—at the inby end of the 800-ft haulage tunnel. These, as noted, supply the chain conveyors, and also 380/125-v three-phase drill transformers in the active mining areas. The 380-v power is transmitted by cables with three power and one ground conductor. Each conductor, colored for identification, is insulated for 600 v, with a neoprene jacket over all. A zig-zag transformer was provided for 4-wire grounded-neutral operation, and the circuit breakers include a ground trip and relay operating on a 10-amp ground current. Electric cable and wire were provided by Cavi Conduttori Elettri, Italy; trolley hardware by Ohio Brass; and battery-charging equipment by International General Electric.

Standby Power—Provided by diesel standby for operation of important motors in event of public-power failure; also used during construction period. Plant supplied by A. D. Struever Aggregatebau, Germany, and includes three 250-kw 380-v AC generators.



ROCK RAISES with laterals to divide vein up into caving areas served by chain conveyors are major elements in plan



GERMAN CUTTING-AND-SHEARING UNIT speeds entry-driving in rock. Support in entries is provided by telescoping steel arches (right), with slusher for speeding up the mucking process.

Underground Haulage — Locomotives, Aliveri No. 1, three 10-ton combination trolley and cable-reel units, pantograph trolley, electric reels with capacities of 300 ft of cable, blower-cooled motors, manual reversible series-parallel drum controllers, steel tires, electric braking, and hand-operated screw-type parking brakes; Aliveri No. 2, three similar machines rated at 8 tons each. Locomotives supplied by Allgemeine Elektricitäts Gesellschaft, Germany.

Mine Cars — All steel, 1-meter (39¾-in) track gage, antifriction bearings, chilled cast-iron wheels, lift endgates, 111 cu ft, 3 tons capacity, Stahlunion Export-GMPH.

Track — 60-lb rail, arc-welded bonds, prefabricated turnouts, cast manganese frogs, parallel-throw switch stands, Bethlehem Steel Export.

Pumping — Each mine equipped with underground pumping station, two 500-gpm pumps (Rontiris-Stromboulis, Greece), with Barrett-Haentjens valves

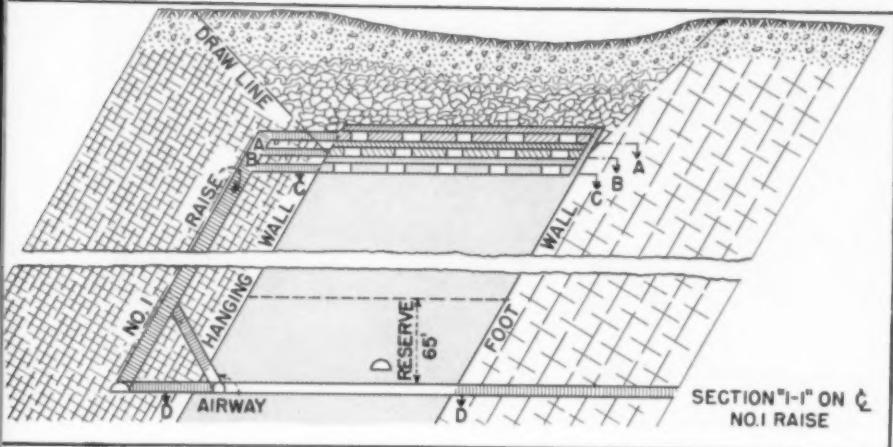
and fittings. Pumps motors, 3,000-v, started manually with magnetic across-line starters, with undervoltage, overload and short-circuit protection. Pump sump separate from gathering sump with valves between to control flow to pump sump. Gathering sump divided into two compartments and movable water chute permits diverting water from one to another, permitting half of gathering sump to be cleaned while other half supplies pump sump.

Ventilation — Provided by Jeffrey propellor-type exhaust fans, eight adjustable blades, antifriction bearings, V-belt drive with sheaves for three speeds, 3,000-v open-type line-start squirrel-cage motors with ball bearings and moisture-resistant windings, combination magnetic starters with low-voltage, overload and short-circuit protection. Fan accessories include: signal alarm with audible and visual indications, including an air-pressure switch and blinker with relay; battery

and horn; 8-in-diameter recording water gage with 7-day mechanism; bearing-temperature relays; constant-level oil lubrication and oil reservoirs for each bearing outside the air duct. Fan output ranges from 50,000 cfm, 1-in water gage, 670 rpm, 10 bhp, 79.0% efficiency, to 100,000 cfm, 3-in water gage, 990 rpm, 62 bhp, 76.0% efficiency. Intake at Aliveri No. 1 is hoisting shaft, tunnel and two strike entries containing the haulage roads; both intake and return designed for size and shape to keep resistance in line with good practice; stoppings and overcasts designed to cut leakage to a minimum. At No. 2 Aliveri, the intake is the slope and the strike entries, containing the haulage roads.

PREPARATION: Precleaning Plus Air Separation

The first step in coal preparation is precleaning in headhouses at each mine, provided by Kampnagel Aktiengesellschaft, Germany. At No. 1 the



for extracting the thick, highly pitching vein at Aliveri mines.

self-dumping cages discharge directly to the headhouse. A rotary dump is employed to discharge the cars at the top of the slope at No. 2 Aliveri. The coal is screened at 4 in, picked by hand and then broken to a top size of 12 in. After processing, the coal is conveyed to the loading bins, from which it is loaded into 9-ton all-steel Differential cars (Gregg Car, Ltd., Belgium), meter gage and designed for rotary dumping, for transportation to the central cleaning plant between the two mines. The cars are pulled by Arn, Junghowmotivfabrik (Germany) steam locomotives, and are discharged at the central plant by a Paul Zurstrassen (Germany) rotary dump. Refuse removed in the headhouses is trucked to the dumps.

Final preparation is accomplished in a Roberts & Schaefer plant featuring reinforced-concrete construction, including walls, floors, stairways and roof. The flow of coal through the plant is shown in the accompanying diagram, and involves separation of the feed into plus 3-in, 3x1 and 1x0 sizes and hand-picking the plus 3-in, which then goes to a crusher. The crusher product is final clean coal. The 3x1 size also is crushed to 1x0 and joins the natural 1x0 from the raw-coal shaker.

The 1x0 goes into a distributing conveyor equipped with rack-and-pinion gates for even distribution of the coal to single-deck screens, which split it into 1x $\frac{1}{2}$ and $\frac{1}{2}$ x0 fractions. The $\frac{1}{2}$ x0 is cleaned in two Airflow units and the 1x $\frac{1}{2}$ in a single Airflow unit. All three cleaners deliver clean lignite, middlings and refuse, with the middlings either recirculated or sent to refuse. Cyclone units collect the dust which, depending upon the unit and the conditions at any moment, may be sent to refuse or clean coal.

Raw-Coal Storage—A storage plant

with a capacity of 100,000 tons (see accompanying plan) was built next to the cleaning plant to accommodate raw lignite during a cleaning-plant breakdown or delay resulting from the power plant not taking fuel; during a period when it is desired to operate the mines but not the plant; and when the mines produce more than the power plant consumes. The plant was supplied by Kampnagel Aktiengessellschaft.

Facilities include a transfer tower with revolving chute to divert the raw lignite from the rotary-dump hopper to these points: power plant, cleaning plant, storage yard, or tower for fueling locomotives, the latter equipped with a bar screen passing the small sizes to the belt conveyor between the cleaning plant and the storage yard. This storage and reclamation belt, 36 wide, naturally is reversible. An airplane-type traveling tripper receives lignite and delivers it to the storage area on each side of the conveyor. And to increase the height of the pile, a locomotive crane equipped with a clamshell (Adolph Peters, Germany) is provided. This same unit reclaims lignite, dumping it into a portable feed hopper discharging to the stacker belt—now operated in the reverse direction.

Repair and Service Facilities—In addition to the other necessary surface buildings, 12 in all, including modern bathhouses at each opening, a fully-equipped shop was provided for minor repairs to mechanical and electrical machinery—especially the conveying equipment used in the mining areas. Major repairs will be made in Athens.

MANAGEMENT: Patterned on U. S. Practice

The core of the Greek management organization which will operate the mines consists of eight Greek tech-

nicians, carefully selected from many applicants, who spent between 6 mo and 1 yr in the United States to acquire a knowledge of the management and operation of large coal mines. In addition to three engineers, the trainee group included an accountant, a lawyer trained in labor relations, a man experienced in safety and first-aid work (M-S-A supplied mine-rescue equipment), a repair-shop foreman, and a man trained in storehouse management.

Each man spent most of his time at or in a mine with men actually engaged in the type of work he was to handle. They also made visits to typical bituminous and anthracite mines and also to iron-ore mines. They also met the public in the mining areas they visited through attendance at meetings of civic organizations. Trainees became familiar with handling of grievances by attending meetings of local mine committees and mine superintendents, as well as meetings of the Anthracite Board of Conciliation.

The organization of the Greek Public Power Corp., Lignite Div., which was active in the development of the property included the following:

A. Dimitrakopoulos, chairman of the board of directors.

Prof. G. Pezopolous, director.

J. Karavidas, delegated counsel, board of directors.

Prof. E. Gounaris, member, board of directors.

All design work and specifications were done by the home office staff of Pierce Management. The following resident staff was in Greece during phases of the project:

Calvin J. Adams, vice president.

John F. McCaughey, assistant to the vice president and general manager in Greece.

Karl E. Gustafson, mining engineer-manager, Aliveri.

Thomas F. Myners, mining engineer-assistant manager, Aliveri.

Carl A. Held, electrical engineer.

A. Damsavage, Benjamin C. Thomas, Emil Rabbitz, mine foreman.

Jerald S. Hanks, comptroller.

Frank S. Scheid, drilling superintendent and special assignment officer.

William A. Kekalos, office manager, Athens.

Andrew J. Zaharatos, office manager, Aliveri.

Harold O. Wombacker, civil engineer-project construction engineer.

Ralph R. Stowell, civil engineer-construction engineer.

P. H. Brabant, mining engineer.

William H. Fourqurean, mining engineer-project purchasing engineer.

Otho L. Drake, electrical engineer.



HOW FORESTRY SERVES—Selective cutting (left) insures the efficient logger an economic operation and protects young timber for future supply. Good practices result in reproduction by yellow poplar and other desirable species (right). Ralph Kemper, forester, checks results in New River & Pocahontas Consolidated Coal Co. reserve.

Six Years of Progress in . . .

Mine Timber Through Forestry

More timber for mine use . . . Tree stands improved . . . Maximum land yield

By H. D. BENNETT, Forester
Appalachian Hardwood Mfgs., Inc.
Cincinnati, Ohio

IN DECEMBER, 1948, when *Coal Age* published my original article on "Mine Timber Through Forestry," we could only forecast what the results would be. The proposed program of the Forestry Div. of the Appalachian Hardwood Manufacturers' Association, a private organization supported by land owners and operators in the Appalachian area, was only getting started. Therefore, proof of the economic advantages of good forestry practices in harvesting mine timbers from coal-field forests in the Appalachian hardwood region was still in the future. Now, after 6 yr, we can show what good forestry practices have done for the land owners and operators who have taken advantage of the possibilities.

The Appalachian hardwood region lies in the mountains between Maryland and Georgia. The northern part of the area is the principal soft coal producing center of the country. Millions of feet of timber are used to mine coal. Membership in the Forestry Div. of AHMI represents over a million acres of forest land. Sound, economic forestry practices put to work in the woods have yielded substantial dividends to investors through better and closer utilization of available timber,

improved forest fire control, and increased growth in residual stands which bring greater income from the forest lands to owners and operators. Many companies now have full-time professional foresters in their employ and many others hire consulting foresters in the region to establish forestry programs on their lands.

GROWTH, NOT LIQUIDATION

The forestry program of the Appalachian Hardwood Manufacturers' Association is under the direction of a professional forester. The four primary objectives being attained are:

1. Active forestry programs at work on the lands of the members.
2. Legislative action on a state level resulting in laws favorable to forestry and private enterprise.
3. Investments in the program from new members.
4. Results from established research studies and demonstrations at work on going operations.

While the timber industry was originally based on liquidation of capital through the harvesting of a mature crop, it is now based on growth. In the Appalachian hardwood region we are cutting about 75% of the growth in our saw-timber stands. Instead of depleting our timber we now have, each year, a net increase in the available supply. While this is a desirable situation it can only be maintained as forestry practices improve

and continue on the woodlands of the region.

FIRE PREVENTION

Forest-fire control has long been our greatest problem in putting forestry to work in the woods. The Appalachian hardwood region was for many years the "hot spot" of the country from the fire standpoint.

As the returns from forest land were increased, as interest in protecting and managing our forest through good forestry practices developed, increased activity in forest-fire prevention and control was a natural development. As a result, co-operation between the state divisions of forestry (which, under the law, are responsible for forest-fire protection in the states) and landowners is now widespread.

Cooperative plans were developed for many landowners setting forth their duties and those of the state in all phases of forest-fire control. As a result, area burned and fire occurrence have been reduced in such areas. In the disastrous years of 1952 and 1953 when, because of extremely dry weather conditions, fires raged throughout most of the region, owners who had not interested themselves in forestry or fire control had 25 to 75% of their land burned over. In contrast, those with effective plans, an outgrowth of their interest in forestry and the efforts of the forestry program, lost less than 1/10 of this amount in area



LARGE OVER-MATURE STANDS of undesirable trees, such as the beech shown here, hamper the development of a new crop of desirable trees. Many beeches needing removal from the forests are hollow-butted (right).

burned. Fire kills trees, burns soil, destroys game, increases water runoff, reduces growth on trees which are left to scratch out an existence on the barren area, and opens wounds in trees for the extensive development of decay. Losses to those who have not protected their land are far greater than the cost of good protection. The forest-fire problem by no means is licked but considerable progress has been made.

UTILIZING BEECH

For many years oak was the principal and often the only species used in the coal mines. It had strength and durability, and was readily available. However, the cutting of a single species from a stand is not good forestry and, through the forestry program, we have been able to demonstrate that other species also had properties well adapted to coal-mining use. To put good forestry to work in the woods, the removal of such species often is essential to the proper development and maximum production of desirable timber of good quality.

Beech is of particular importance from this standpoint. It often grows in pure stands on the best sites. It is usually over-mature and defective, and occupies space on which more desirable trees—yellow poplar, oak, maple and ash—should be growing. In fact, areas supporting such beech stands are, for all practical purposes, out of production and offer little return to the landowner. To get this timber removed from the forest the forester had to demonstrate to the coal operator that beech was a species suitable for mine timber, and to the sawmill operator that it could be economically cut and sawed into mine timber products.

Two properties are essential for



MINE-TIMBER SAWMILL produces both grade lumber for market, mine timber and treated timbers for permanent installation.



HOLLOW AND DEFECTIVE MATERIAL damaged by fire is salvaged for mine timbers at mine-timber mill.



TREE FARMS are an important phase of the forestry program. Those interested in their development include this group: John Tillinghast (left), consulting forester; H. E. Mauck, general superintendent, Olga Coal Co.; W. A. McNees, forester; the author; and R. E. Snelling, Pocahontas Fuel Co., Inc.

good mine timbers; strength and durability. To show the strength of beech, mine timbers were cut and tested for breaking strength in hydraulic presses. At the same time, timbers of other species, including oak, were taken from the mine wood yard and similarly handled. In every instance, beech compared favorably with the other species tested. While beech has a low resistance to decay, tests show that in temporary workings it will do the job required. However, beech was shown to take preservative treatment very well, making it readily adaptable to use in permanent installations—at an actual saving over untreated timbers of more durable species.

RESEARCH SHOWS WAY

To demonstrate that mine timbers could be produced economically from beech, operating techniques were developed and time studies were made in the woods and at the sawmill. Here again forestry demonstrated its worth, since the cost of producing mine timber from beech compared favorably with other species. Today, as a result of the forestry program in the Appalachian hardwood region, millions of feet of beech timber are now used in the coal mines. Now, where once grew pure stands of over-mature and defective beech, we have fine young stands of yellow poplar, oak, maple and ash. This will mean a valuable timber crop for the landowner in the years to come. Because we have been able to use beech, many thousands of young polesize oak and yellow poplar which would have been cut have been left to grow to maturity. Through this phase of good forestry the landowner has an opportunity to

realize a greater return from his investment in his forest land.

REALIZING ON QUALITY

Mine timbers have a fixed value regardless of species or quality. They must meet certain specifications, but quality above these specifications carries no premium value. Before forestry was put to work in the area many high-quality trees were being sawed into headers, ties, brattice lumber and other mine material. These trees were much more valuable for quality Appalachian hardwood lumber. From this angle, proper utilization of available timber to bring the maximum return to the landowner and operator has been an important phase of the forestry program.

Before the timber on an area is harvested the trees to be removed are marked or designated for cutting. Where there is sufficient volume to permit it, the quality timber is first removed in a commercial lumber operation. This is followed by cutting the mine timber. Quality timber is made available to the commercial market, returns from the forest land are greatly increased for the landowner and, through better utilization of the remainder of the timber ready for removal, mine requirements are satisfied. The mine-timber operator also has an opportunity to use the roads and improvements put in to remove the commercial timber, thereby reducing his cost of producing mine timbers.

In stands where the volume of commercial timber is not sufficient to warrant a separate operation, the mine-timber operator produces quality lumber as it becomes available and sells it on the market when he has sufficient

quantity assembled. This increases the stumpage return to the landowner as well as income to the operator. Steering forest products into the markets to which they are best suited increases the return to all concerned.

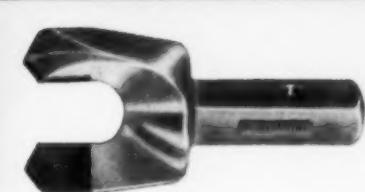
Demonstration areas and research studies established 6 yr ago are now giving us the answers to many of our forest problems and showing the economic advantages of sound practical forestry. Over the years many meetings have been held in the woods to demonstrate good forestry. Those in attendance have been coal operators, sawmillers, foresters and landowners. Demonstrations have given those in attendance an opportunity to take home what they saw and put it to work on their own operations.

MORE FROM THE LAND

Before forestry was put to work in the woods only about one-half to two-thirds of the economically recoverable timber was utilized. Increased yield has been accomplished through better utilization of trees cut and the extension of cutting of trees heretofore considered unmerchantable but now demonstrated to be economically recoverable. By more intensive utilization more small trees can be left to grow in the woods. Where once we were growing about 100 board feet per acre per year, now, where forestry has been put to work, a growth of 200 bd ft or more is often found.

One major result of the forestry program has been the establishment of "Tree Farms" in the region. Of the 36 states which are now members of the Tree Farm Program, seven are in the Appalachian hardwood region. A "Tree Farm" is a forest which has been certified by a professional forester as an area on which the trees are being properly cut, and which is dedicated to continuous production of timber through good forestry practices. The number of "Tree Farms" and the acreage they represent is steadily increasing each year.

In 1948, the expressed aim of the program was to demonstrate that sound, practical, economic forestry was a good investment on which substantial returns could be expected. We can now show we have hit our target. Greater volume of material from the trees cut is finding its way to market. Good thrifty residual stands are growing at increased rates. Through steering products to the best markets greater returns are being realized from forest lands. The number of professional foresters working on private land has been increased. All of this reflects the value of good forestry at work in the woods.



Bit cost reduced 51 percent at Peters Creek Coal Company using Kennametal* D-3-inch Bits

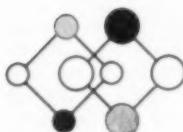
High in the mountains of southern West Virginia, the Peters Creek Coal Company is maintaining a shift average of a brisk 21-ton per man mining out fingers of its Eagle Seam using Kennametal D-3-inch Bits.

In this seam, mining is normally limited to the 28-38 inches of coal sandwiched between two bone bands. This coal is exceedingly difficult to cut and drill, and face preparation requires major attention.

Kennametal Bits are used by the Peters Creek Coal Company as a result of drilling tests made several years ago as a part of a modernization program to increase production. For a two-month period, conventional steel and Kennametal D-3-inch Bits were tested. Accurate bit cost records proved that, during that period, the cost of conventional steel bits was \$187.00. The cost of the Kennametal Bits was \$92.50 . . . a saving of over 50 percent.

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FOREMEN'S FORUM



The Constancy of Change

. . . a slightly-fabulous history of the development of supervision, and how this history is repeated in the experience of each individual.

ONCE UPON a Neanderthal time there lived a caveman named Ugu who spent all his daylight hours hunting game to supply his family's food needs. He was rather slow afoot, but in compensation for this shortcoming he had trained himself to become an expert club thrower.

For these reasons his family's nutrient consisted mainly of the flesh of giant jackrabbits. Here is why. The jackrabbits in those days were wont to tease the clumsy hunters by feigning sleep to permit the cavemen to crawl up within club-swinging distance. Then, at the last moment the beasts would bound away.

Being somewhat sharper than the rabbits, Ugu had perfected his aim, as mentioned, and woe betide the rabbit who closed his eyes on him. Swish—klunk—meat on the table.

Now farther down the street in another cave lived Llg and his family.

Llg was a failure as a club thrower. He could not hit the side of a cave from the inside, the other men all said. But oh, how he could run! His family's fare consisted mainly of eohippus (small prehistoric horse) because Llg loved to hunt these, to the exclusion of all other game, for the sheer joy of running them down.

One evening Ugu walked down the street devouring a haunch of rabbit and Llg walked up the street working on

an eohippus joint. Upon meeting they exchanged greetings and each offered the other a taste. Both were pleasantly surprised by their new taste sensations; they had not realized that variety in diet could be so wonderful.

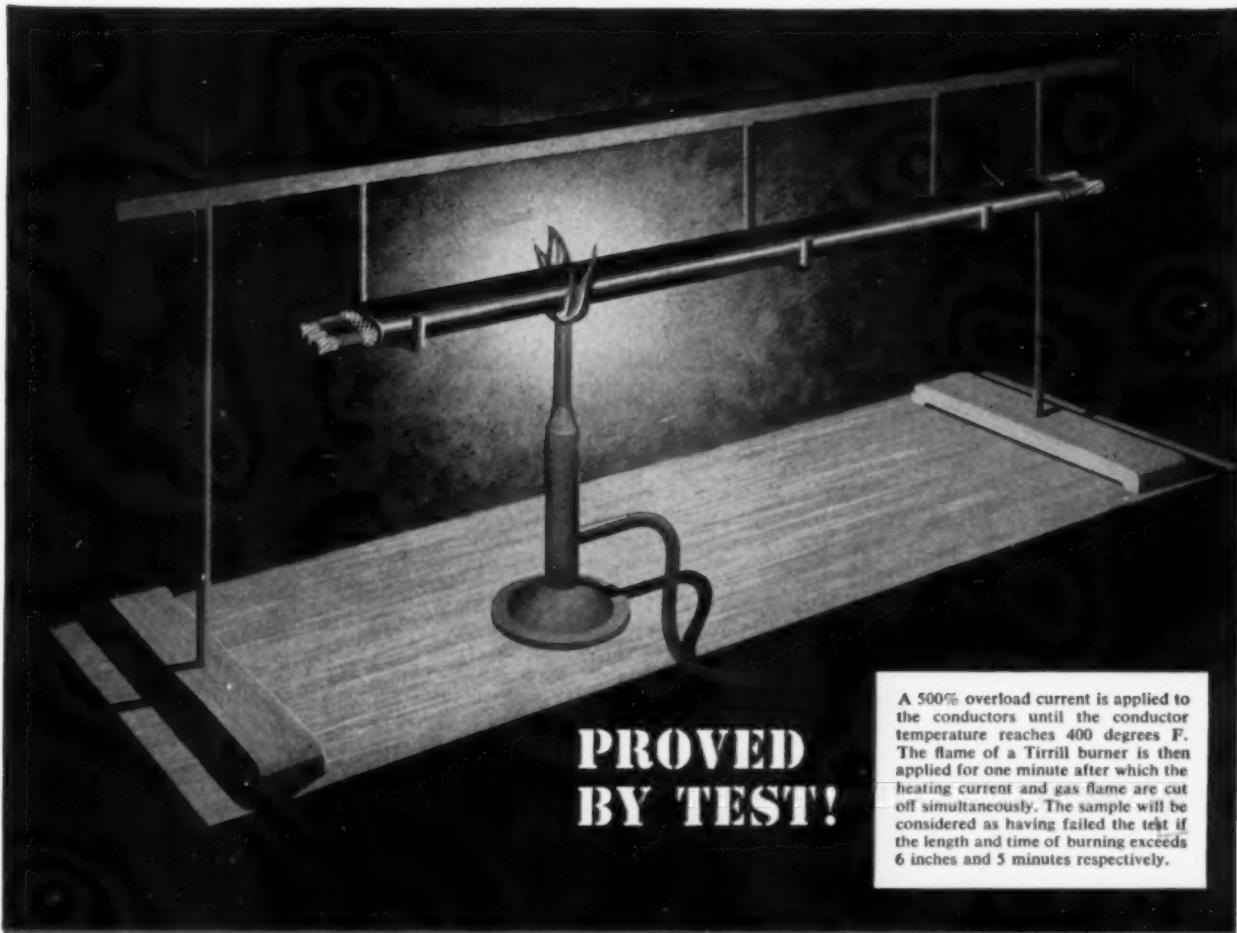
Immediately they began to ponder how each could supplement his main fare with some of the other's staple, and their final decision was that each would teach his particular skill to the other. So they did.

Ugu became a better-than-average runner after Llg had taught him all the tricks of doubling-back, cross-looping and button-hooking in pursuit of game, while Llg under the able tutelage of Ugu mastered the technique of the snappy overhead toss of the club to replace his own erratic side-arm motion. And now they set up a schedule with Ugu hunting eohippuses one day and jackrabbits the next, and Llg vice versa, so that both

Confucius say:

Superintendent who cover seat of office chair instead of territory, stay on bottom.

—Sign in a Mine
Superintendent's office

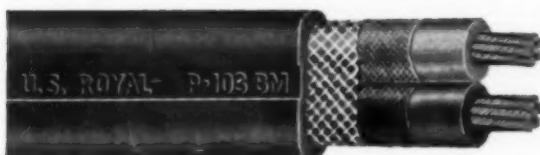


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families would have both foods and the men would not interfere with each other in the field.

One morning Llg announced that although he had hunted jackrabbits the previous day, he had decided to hunt them again today. Being a stickler for keeping schedules, Ugu retorted, "If you bring home a single jackrabbit tonight, I'll bust you with this club. You hunt eohippuses today."

Llg did not contest the issue. He hunted eohippuses that day, thereby permitting Ugu, through direct seizure of authority, to become the first boss in human history.

Time passed and human society became more complex. Families became tribes and tribes became nations. And the nations, in the days when the Pharaohs ruled early Egypt, spent total energy in either of two pursuits: making war or building monuments. This pointless existence revolved about a hub of slave labor, although none could remember whether the monuments were built to keep the captives busy or the wars were fought to supply labor for future monuments.

At any rate, a new type of boss was in style. He did not have to be smart enough to seize authority for himself, his authority would filter down from the Pharaoh. All he needed was a leather whip and the will to use it. Pharaoh's engineers would plan the work for him and point out the spot where each stone should be placed, and there were no timebooks.

More time passed. Confusion reigned during the Industrial Revolution and monotony reigned in the recent heyday of the assembly-line philosophy of production. Supervision in some corners of industry often became a plodding routine of "looking over", just as implied in the root meaning of the word.

However, nothing is constant but change. Someone always makes it his business to question the *status quo*. Right now there are a couple of noteworthy trends in industry. One of these, described as job enlargement, provides that wider use be made of an employee's total skills. Instead of performing a restricted repetitive function, the employee now starts with a supply of parts and builds an assembly or sub-assembly to completion. Where job-enlargement has been instituted it has resulted in increased productivity.

The other trend is described in the strange tag "cybernetics," which loosely translated means automatic process control and unattended transfer of materials from one stage of manufacturing to the next.

The point we're making is that as each of these new trends develops, there is a parallel demand for higher-type supervision. Ugu and the strawboss on the Pyramid job can't measure up.

Such is the fabulous history of the development of the profession of supervision. What does it tell us? Well, Shakespeare in his play, King Henry IV, has one of his characters say, "There is

history in all men's lives," implying that individuals, like society, follow this classic pattern of constant change—for the better, we hope.

Let us back off and watch a man—any man—develop. A newborn baby is the most selfish little package in all creation, and our subject is no exception. He cries loudly for all kinds of service and stops only when his needs are filled. He cares not who serves him nor how much they have labored in serving him. There is no room in his world for anyone but himself.

Sometime later his world broadens to include his mother, then his father. Still later he learns to share with his contemporaries. He is emerging from the Ugu stage of his development.

As time passes he begins to feel the urges of youth. We fondly say, "He is feeling his oats." In this stage of development, the young fellow may lash about in apparent disregard for the rights of others. We wonder if he is regressing into his old selfishness. Really he isn't. He is clumsily barging along in his newfound confidence, and he's enjoying every minute of it. This confidence is his Pharaoh, but like the strawboss on the Pyramid he is riding for a fall because Pharaoh is not eternal.

The rude awakening comes, and our young man is confused for a time. But in his confusion he is learning to make moral choices. He is coming to maturity. All at once he is no longer confused.

Our man is not fully developed yet. His next encounter is with monotony.

The workaday business of earning a living begins to get him down. But not for long, because this man of ours is intelligent. He recognizes the constancy of change. Therefore, he relieves his monotony by developing new interests, perfecting his skills and finding satisfaction in his appointed work.

There he is—a mellow, mature, worthwhile individual within his sphere of influence. Is not this how it was with you?

A somewhat similar pattern prevails in supervisory development. The young boss naturally may jealously guard his prerogatives; he may use his company's backing as an excuse for throwing his weight around. Inevitably he must come face to face with an utterly confusing situation, one where the old rules don't seem to hold and there are no new rules to lean on. He will either give way to panic or buckle down to the job of clearing the confusion.

Then there is the problem of monotony, in coal-mine supervision as in any other industry. The mature supervisor welcomes every day as a new challenge to his ability and ingenuity. He classifies monotony as a figment of under-developed imaginations because he knows change is constant.

The moral is that there is no easy road to achieving supervisory polish. The mature, balanced foreman is one who has lived through and profited from a number of bitter experiences in his career. We can think of no shortcuts across this historical pattern of development.

Economic Glossary

JUMPING OUT OF THE HEADLINES these days is a perplexing vocabulary of economic terms. Words commonly used by economists, commentators and editorialists have a very precise definition to their coiners but frequently conjure up in the uninitiated's mind an image of business that is far from accurate.

M'sunderstandings like this stem sometimes from the casual turn of a phrase by industry's detractors or from the need for brevity in a newspaper headline. Whatever the source, newspaper and magazine readers and TV and radio listeners can easily gain an erroneous picture of industry and business, unless they are able to translate fantasy into fact for terms such as these:

Absentee ownership suggests a vision of a few disinterested individuals leading the life of Riley. Factually, today most business owners are absentee owners—people spread across the nation in all walks of life who invest savings in shares of a company.

Oligopoly implies that large producers connive to divide a market. Actually, when there are a few large sellers—as in gasoline distribution—the customer ultimately decides what portion of busi-

ness each producer shall have. He bases decisions on price, quality and service.

Conscious parallelism might conjure the image of competitors exchanging price data. The fact is the customer, when choosing among goods of comparable quality, will seek the lowest price, and that tends to set the price for all producers.

Merger gives the impression of businessmen combining only to increase their power. Most business mergers today are designed to make possible efficiencies in production or to broaden product lines or markets. Recent auto mergers were designed to do just that.

Fast tax write-off implies tax-savings for industry. Actually, cost of property may be deducted only once from profits. Depreciation features of the new tax law merely permit timing such deductions more nearly in line with real loss in value of the property.

Undistributed profits bespeak earnings held back to line pockets of privileged owners. Actually, they are "seed money"—that part of a corporation's earnings retained to build new plants and provide for the company's security and growth.

—Reprinted from *Better Living*, a publication of E. I. du Pont de Nemours & Co.

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ALGERIA

CANADA

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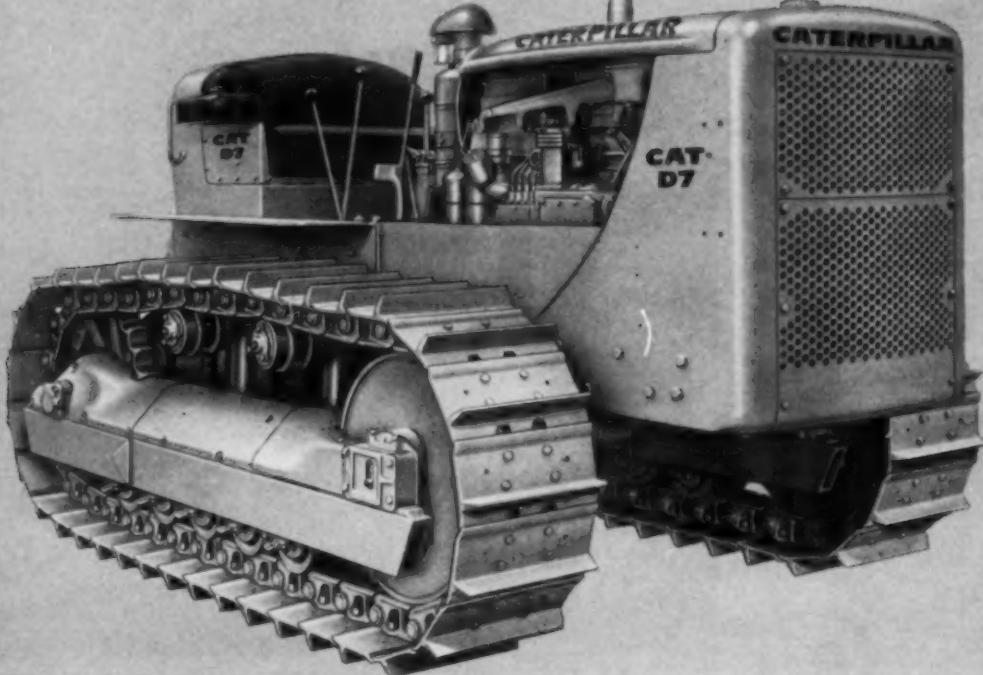
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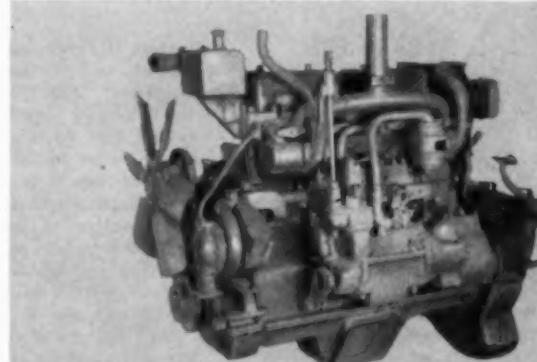
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OPERATING IDEAS

Sunken Hoists Get Closer to Track

AN ECONOMICAL METHOD of securing a reasonably straight rope pull for hoist-retarders on loading tracks at the preparation plant was utilized at the Amonate mine of the Pocahontas Fuel Co., Inc., Amonate, Va. Company engineers specified that the hoists be sunk below ground level so that they could be placed near the ends of the ties, thus reducing the fleet angle, while still having the necessary clearance for passing cars.

The rope is reeved to the top side of the drum and the hoist is positioned so that the rope will just clear the ground-level wall at the hoist, as shown in the photograph at the right. Seven hoist-retarders have been installed in this manner at the Amonate preparation plant. The hoists are Brown-Fayro units, rated at 12,000-lb rope pull, 50 fpm.



Consider Reconditioning Your Tractor Parts

By D. R. LAMMERS
Service Manager
Caterpillar Tractor Co.
Peoria, Ill.

NOW THAT NEW PARTS are readily available, tractor owners should carefully consider the value of reworking worn parts. Many ingenious methods of rehabilitating worn tractor parts have been practiced in recent years. Some salvage methods proved practical and economical, while others were expensive but necessary to keep badly needed machines in operation. When followed on a sound, economical basis, parts reconditioning offers machine owners better and lower cost service.

Many reconditioning practices are so practical and have been universally used so long that we forget to classify them as such. Among these are regrinding crankshafts, turning track pins and bushings, and reboring and sleeving bearing bores in transmission cases and final drive covers.

Etching and raising the ridge in worn cylinder liners, using wide top compression rings on worn pistons, and installing valve seat inserts in cylinder heads are common salvage practices on engine

parts. Hard-facing cutting edges and bucket teeth, straightening sheet-metal guards and hoods, and building-up with electric weld worn spots on heavy fabricated steel parts also will remain popular because of their economical value.

Other practices resulting from past parts shortages that will continue to be used because of their practicability include the building-up of track grousers, track rollers, idlers and sprockets, and regrounding track roller shafts using undersize bushings.

Welding new rims on sprockets, building-up the outside of worn steering clutch drums or using extra-thick brake linings, and installing clutch drive rings in flywheels, also have become widely accepted. The simple taper-pin method is common for the repair of cracked cylinder heads.

Track links have been built-up with electric welding rod, but while this has been entirely successful its economy is questionable. The advisability of repairing track links by this method can best be determined by local experience.

Obviously, if a part can be reconditioned for much less than the cost of a new part and if the reconditioned part functions properly with a new life expectancy approaching that of a new part, the owner will prefer to have the

part reconditioned. Many times, however, purchase of new parts will prove economical.

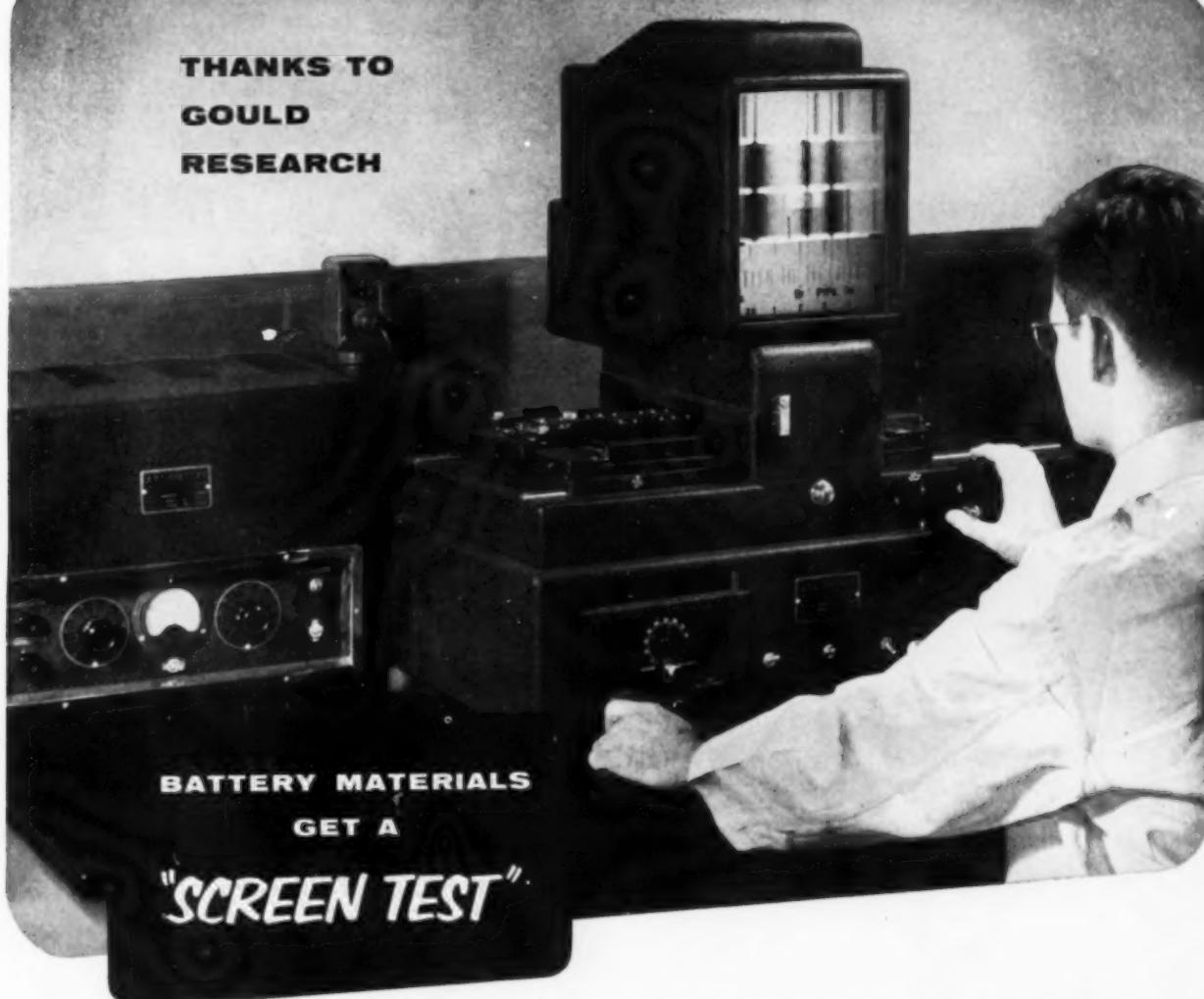
There are some reconditioning procedures practiced which are believed to be definitely not advisable. Foremost is the repairing of fuel-injection pumps, which frequently results in inaccurate fuel-injection timing because of variations in dimensions of fuel-pump bodies. Repairmen invariably neglect to compensate for these variations. The discrepancies in timing usually are not great enough to cause noticeable malfunction of the engine but could easily nullify the saving by increasing the fuel consumption or rate of depreciation of other engine parts.

An owner will spend less for fuel-injection pumps by buying new pumps only when the old pumps are worn enough to cause hard starting or a noticeable lack of power.

Regrinding crankshafts to intermediate undersizes is another example of false economy in reconditioning parts. It is recommended that the shaft be used until it is worn enough for regrounding to the standard undersize. Regrinding long before the crankshaft reaches this point is unnecessary and a waste of money. It also requires additional labor in the special fitting of bearings.

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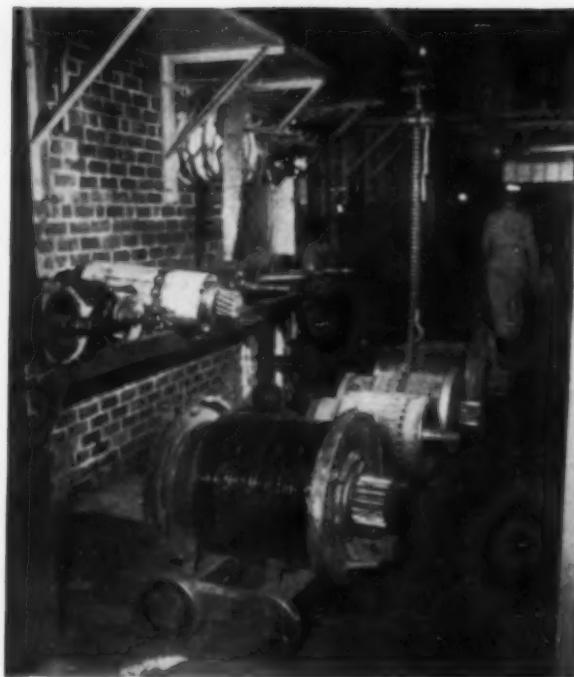
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Use of Pier Cuts Pump Installation Cost

CONSTRUCTION COST of a river pump installation at Valley Camp No. 8 mine, Shrewsbury, Kanawha County, W. Va., was cut to a fraction of the usual cost by utilizing one of the piers or cells built for barge control. This new mine (p 70) loads to both rail and river and the river installation includes 13 cells, the smallest 5 x 5 ft and the largest 20 ft in diameter.

A 15-ft cell was utilized for the pump, shown in the accompanying photo. During construction a pump casing was installed in the center and a horizontal pipe was extended out from the bottom through the side of the cell. The opening is covered with an easily cleaned screen. The pump is a Pomona turbine-type unit driven by a 25-hp, 1,800-rpm, 440-v U. S. motor. It pumps directly to a 55,000-gal tank located on the hillside which supplies wash water to the preparation plant, and water for dust control and fire fighting to the mine.



Armature Racks on Wheels Save Storage Space

STORING SPARE ARMATURES so that they can be reached individually by a hoist or crane usually requires considerable floor space. To solve this problem, mechanics at Amonate mine of Pocahontas Fuel Co., Inc., Amonate, Va., designed storage racks mounted on wheels made from discarded ball bearings.

As an indication of the ease of handling, the lower rack shown in the photo, which carries a 20-ton locomotive armature (foreground) and four other heavy armatures, was rolled out from the wall to its position under the monorail by one man. When rolled back to the wall, the rack rests under another higher rack carrying smaller armatures and similarly mounted on the same type of small-diameter wheels utilizing ball bearings.



Getting at High Supply Bins Easier With Stairs and Balcony

STAIRS AND NARROW BALCONIES, instead of movable ladders, are used to reach high bins in at least two of the mine supply rooms of the Pocahontas Fuel Co., Inc. The accompanying unposed photograph was made in the supply room in the shop building at Amonate mine, Amonate, Va.

The two men shown on the balcony discussing and comparing certain parts serve to illustrate how handy the balconies are as compared to a ladder. It is generally believed that stairs are safer than a ladder, and stairs obviously provide a better way of handling some of the heavier parts and carrying several items at one time.

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CHANCE PROCESS

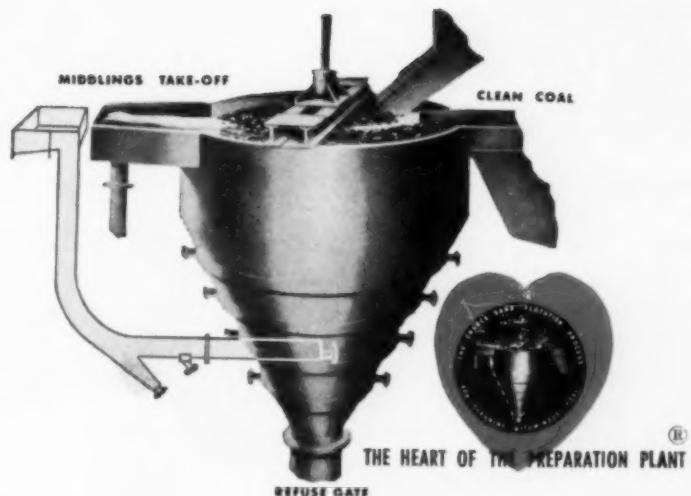
THE ORIGINAL HEAVY-DENSITY COAL CLEANER

3-PRODUCT CHANCE CONE OFFERS ALL THESE FEATURES

- new low maintenance method of elevating refuse
- automatic refuse withdrawal
- cleans coal down to 1.35 gravity
- takes off middlings from 1.35 to 1.70 gravity
- over 99% recovery of salable coal
- cleans wide range of coal— $\frac{1}{8}$ " to 10"
- one-man gravity change-over in 5 minutes
- capacities 40 tph to 600 tph

Chance Cones, in use in all the major coal producing countries of the world, are cleaning over 123,000,000 tons of coal annually. Chance Cones produce exceptionally high tonnage of specification coal at lowest cost per ton. Find out more about the IMPROVED Chance Cone. Write for full details today.

The new middlings take-off is optional with new equipment and can be fitted to cones already installed.



UNITED ENGINEERS & CONSTRUCTORS, INC

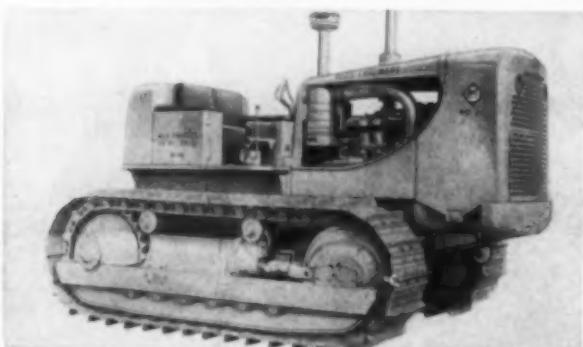
NEW YORK 17 PHILADELPHIA 5 CHICAGO 2
WITH A BACKGROUND OF OVER SEVENTY YEARS' EXPERIENCE

EQUIPMENT NEWS



New Rotary Blasthole Drill For Holes up to 9-In in Diameter

A new Model 40-R rotary blasthole drill for putting down medium-diameter holes, designed along the same lines as the larger 50-R, the first rotary machine capable of drilling 12½-in.-diameter blastholes, has been announced by Bucyrus-Erie Co., S. Milwaukee, Wis. The 40-R is available with electric or diesel-electric power and is equipped to drill 6½- to 9-in.-diameter holes. According to the maker, the crawler-mounted drill incorporates such design features as hydraulically powered down pressure on the bit for maximum controlled penetration; Ward Leonard electric control for rotation of drill pipe, for propelling and for hoisting and lowering of derrick machinery; continuous drilling for 27½ ft before an additional drill-pipe section must be added; a remote-controlled power-driven unit which permits drill-pipe sections to be quickly added or removed without manual effort; air-blast cleaning of drill hole; and an operator's cab so located that the operator is immediately adjacent to the drill hole at all times. Details from B-E.



New Tractor Offers More Power

Reportedly biggest and most powerful crawler tractor ever put into production, the new HD-21 is designed to meet

demands for a tractor with more power, longer life and the ability to operate at a lower cost per unit of work, according to the Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. The tractor weighs 44,000 lb, develops 204 hp at the flywheel and offers a high-output torque-converter drive as standard equipment. Among its new design features cited by A-C are a new high-capacity cooling system, a new master clutch, new transmission, new Tru-Dimension track, new Wrap-Around radiator guard and the new A-C diesel engine. The HD-21's new power plant utilizes the latest developments in combustion-chamber design, which results in higher sustained working pressures at the most favorable crankshaft angles, it is said. The high-output performance of the torque converter-engine-transmission team provides extra speed with any load, extra pulling power at any speed, plus wider speed ranges and more range overlap, according to the maker. The combination of new track design, heavier weight and new heat treating methods is expected to set new standards for track life, it reports.



Varied Features for 23-yd Scraper

Announced by LeTourneau-Westinghouse Co., Peoria, Ill., as the first new machine completely designed and built by the new company is the Model B Tournapull—a 23-yd, single-engine, self-propelled scraper. Struck capacity of the Model B Scraper is 18 yd; heaped, 23 yd with sideboards. The unit is 40 ft 6 in long, over-all, and 11 ft 8 in wide and 12 ft 7 in high. Powered by a 293-hp diesel (with choice of Cummins or General Motors engine), the Model B offers 10 gear ratios, ranging from 2.4 to 28.4 mph, which the maker points out, permits selection of working speeds best suited to underfoot conditions. Other features cited for the new Model B include the easy loading characteristics of its new scraper design; deflector plate; high apron lift; wheels inside the cutting edge of the scraper blade; power-steer steering wheel; full-shift fuel supply; engineering stressing easy operation and accessibility of components; and high maneuverability, with non-stop turnaround within a 35-ft space. Interchangeable with the scraper for use with the B Tournapull is a 35-ton rear dump, rated at 23 yd struck, and 27 yd on a 2:1 heap without sideboards. Full data from LeTourneau-Westinghouse.

Mine Jeep Built for Low Coal

Latest addition to the Lee-Norse line of Mine Jeeps, the TJ6 is a new low-type scooter developed to provide speedy transportation for mine officials, mechanics and firebosses. It is said to comfortably ride two men besides the operator and features ample storage space at one end for hauling necessary tools and

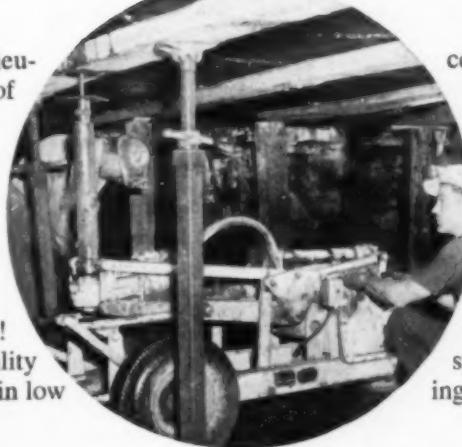
CP
beats
the
clock . . .

Clock the speed of the Chicago Pneumatic RBD-30 Permissible Roof Bolting Unit. It takes less than 3 minutes to complete an entire cycle from the time it's wheeled into position, drills hole and sets expansion bolt. That's not all! It's even faster where hole depth is less than 36" . . . completes the cycle in 1½ minutes flat!

Low over-all height and portability permit easy access and operation in low

to cut roof bolting costs

ceiling areas. The chuck is telescopic . . . permits 6 inch auger adjustment to conform to roof irregularities. Built-in slip clutches protect the drill and bolt setting motor . . . prevent feed motor from stalling. And the CP RBD-30 is available with water swivel attachment; special low speed spindle adapter for slow speed drilling and a low seam drilling attachment for low coal areas.



Chicago Pneumatic

8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

COAL AGE • March, 1955



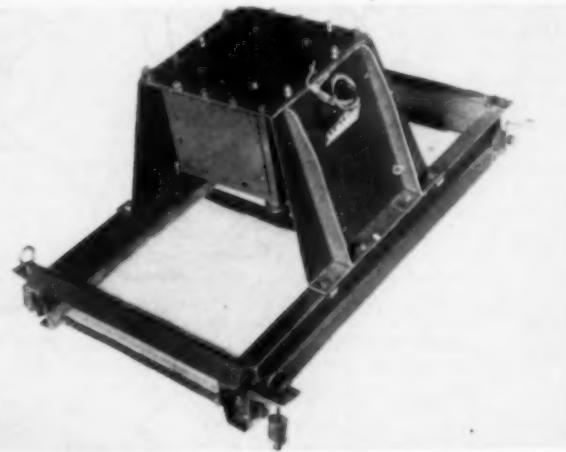
materials. With a maximum trolley pole height of only 26 in., the Lee-Norse TJ6 is for use in 30- to 48-in. coal, weighs approximately 1,200 lb and is powered by a 3-hp motor. The TJ6 has a headlight on both ends, as well as a red reflector warning signal, and improved type brakes are used on one axle. Full details from Lee-Norse Co., Charleroi, Pa.



Higher Performance for Scraper

Designed for a new high in dirt-moving ability through more power, better performance and longer life, the new Allis-Chalmers TS-360 Motor Scraper has 15-cu yd struck capacity, 20-cu yd heaped capacity and features a new 280-hp Allis-Chalmers diesel engine. This new engine spearheads a whole new power train that offers more rim pull at all speeds for better loading, hauling and spreading performance; plus faster acceleration, easy shifting and quick getaways, the company

reports. A completely new tractor main frame, which permits all the advantages of "unit construction" long featured on A-C crawler tractors, facilitates easy removal and servicing of both major and minor assemblies in the TS-360, it is pointed out. Other new operating advantages cited by the company include selective steering, "Double-Safety" air brakes, rapid cable-control response and a new electric starting system completely controlled with a key. The scraper has the same easy loading, positive dumping through forced ejection featured in the A-C line of high-production scrapers. Details from the Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.



New Features for Vibrator Line

Recent advanced developments of electromagnetically operated equipment are included in the new features of its VS-Series of vibrating screens according to the Syntron Co., 975 Lexington Ave., Homer City, Pa. The VS-Series of screens are compact, lightweight and ruggedly constructed with dust-sealed electromagnetic vibrators, it is pointed out. They are available for cable-suspension mounting or with triangular supporting frames for floor mounting to maintain the screen surface at an adjustable angle of from 33 to 40 deg from the horizontal and also can be furnished with "fines" collecting hoppers. The single-deck, single-vibrator models are available in four sizes up to 48 x 72 in.; and the double-deck, dual-vibrator units in three sizes up to 36 x 60 in. Literature from Syntron Co.



AUTOMATIC MINE-CAR COUPLER FEATURES SAFETY, FAST ACTION

Mayo Tunnel & Mine Equipment, Lancaster, Pa., has announced development of a safe, quick-acting car coupler for narrow-gage mine cars. Entirely automatic, the Mayo coupler hooks on in seconds to completely eliminate all the hazards of hand coupling. To disengage, operator simply lifts eye, located safely out of the way on top of the female coupler head. Each coupling offers 2-in. slack to permit gradual starting of a heavy train and all parts are made of cast steel for long trouble-free service. The Mayo automatic coupler may be attached to any existing mine car simply by drilling four holes at each end and its

cost is about half that of comparable equipment, the company reports. Bulletin 21 gives details.

FULL ELECTRONIC CONTROL FOR ELECTRIC SHOVELS

Harnischfeger Corp., 4620 W. National Ave., Milwaukee 46, Wis., now offers electronic control as standard equipment on P&H electric shovels. The new control governs all shovel-operating motions, and marks the first time full electronic control has been applied to large excavating equipment, the company reports. Among the advantages cited are more rapid signal response from controllers, permitting better co-ordination of shovel motions by the operator; greater ease of operation with the desirable stepless controller feature retained; and reduced shovel cycle time because of faster response and the finger-tip ease of control. To emphasize the extreme simplicity and reliability of this electronic control system, P&H reports that the electrical circuits and components can be understood easily by any electrician. All



electronic equipment is shock-mounted on removable panels for easy accessibility and maintenance. P&H electronic control

New Trolley Wire Conditioner Shakes Up Easy in 2 Minutes

NOW AVAILABLE IN 1-GALLON CANS

- New Type-D Conditioner stays in suspension longer . . . requires no special mixers and does not cake on bottom of container.
- Provides a thinner coating and lower electrical resistance to reduce arcing and burning of wire and shoes.
- Stays on wire longer, reducing number of applications you have to make a year.
- Cuts down friction, dust and dirt do not cling to wire.
- Flame resistance is maintained over entire life of Conditioner.

Ohio Brass
MANSFIELD  **OHIO, U. S. A.**

IN CANADA: CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

Feeder and Trolley Materials • Control Materials • Trolley Shoes
Roof Bolt Shells and Plugs • Rail Bonds • Automatic Couplers





AW-22 Rail Bond assures faster welding.... lower terminal resistance



- O-B designed the AW-22 Bond for fast above-base joint bonding, below-base joint bonding, or cross bonding.
- Angular shape of AW-22 bond terminal eliminates interference from rail head. Welder can move rod along unobstructed path.
- Wide angle between rail surface and terminal edge also creates open welding area. Not only speeds up under-base bonding but cuts need for more than one bead.
- Clip-shaped portion of O-B's AW-22 bond terminal fastens on rail quickly . . . holds securely during welding . . . makes cross bonding easier.
- AW-22 Bond provides greater electrical economy in service by shortening rail-to-copper electrical path and minimizing terminal resistance.

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Be sure to ask your O-B representative about the
O-B Wedge Bond, too, shown at right. They provide
mechanical and electrical joint with 20,000 pounds
pressure against hole wall.





**String Cable *fast*. . .
hold it securely
with this new O-B Feeder Sling**

- No need to take this Thru-Bolt Feeder Sling apart when you string cable. Just loosen the single nut, slip in the cable, and spin the nut a few turns to hold the cable during tensioning.
- When cable is tensioned, tighten nut completely with wrench.
- Low over-all height (small size, $2\frac{7}{8}$ inches; large size, $3\frac{1}{4}$ inches) gives maximum strength on side loading.
- Small size (Catalog No. 22454) accepts cable from 4/0 to 1,000,000 cm. Large size (Catalog No. 22455) accepts cable from 500,000 to 1,750,000 cm.
- Can be used with copper or aluminum cable.

Ohio Brass

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Feeder and Trolley Materials • Control Materials • Trolley Shoes
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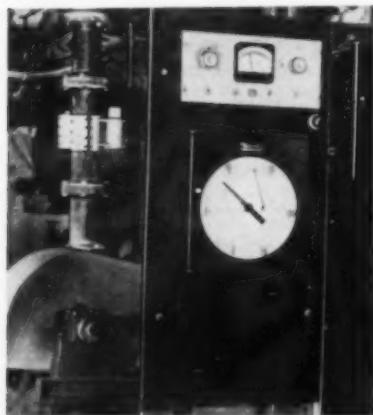
4587-M

is offered as standard equipment on P&H Electric Shovels from P&H model 1400 (4½-yd capacity) through the P&H Model 1800, an 8-yd machine. Details from Harnischfeger.



NEW-TYPE ADJUSTABLE DRIVE

A completely new adjustable-speed drive, the "Dynaspede" coupling, developed by the Dynamatic Div., Eaton Mfg. Co., 3307 14th Ave., Kenosha, Wis., is a stationary-field, liquid-cooled, eddy-current adjustable-speed power-transmission device offering various design and operational advantages. The absence of all rotating electrical components provides superior performance, reflected in reduced maintenance and adaptability to hazardous, moist, dirty and other adverse locations, the maker points out. Liquid cooling efficiently provides an effective heat-transfer medium, permitting very wide speed ranges at constant or reduced torque and, under certain conditions, constant horsepower. Various types of easily applied controls, from AC power source, provide stepless speed control and almost unlimited special process requirements, it is said. Full data in Bulletin SF-2 from the company.



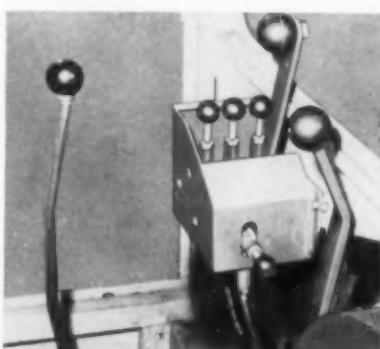
PERCENT SOLIDS MEASUREMENT

Per cent by weight of solids or liquids in slurries can now be readily measured and controlled with its new model PS Series density gages, according to the Ohmart Corp., P. O. Box 67, Sta. B, Cincinnati 22, Ohio. The gages use radioactive absorption and Ohmart

cells as the measuring means, as do other Ohmart density gages already being used for liquid level and specific gravity measurements. All measuring components are located external to the pipe or vessel containing the slurry being measured, so that agglomeration and abrasive conditions encountered do not interfere with gage operation. The new Model PS density gages have a high degree of sensitivity and precision, the maker reports, and are sturdily built for severe industrial service. Bulletin 585 gives details.

SPEEDS SOLIDS FLOCCULATION

"Guartec," a natural vegetable colloid marketed by the Special Commodities Div., General Mills, Inc., 400 Second Ave. S., Minneapolis 1, Minn., has been tested successfully in the flocculation of solids from coal washings, the company's research laboratories have announced. Guartec, when added to coal-washing, speeds the settling and makes possible relatively small settling ponds, it is pointed out. An industrial gum, Guartec is obtained from the guar bean, a drought-resistant legume introduced to this country from India and now grown in the Southwest. Full details from General Mills.



SHOVEL OPERATING EFFORT CUT

Machines in the ½- and ¾-yd classes, built by The Thew Shovel Co., Lorain, Ohio, now are equipped with "E-Z" action controls which the maker says reduce the effort on the operating levers by 70%, thus affording extremely easy operation and exceptionally fast response. The operating levers actuate the clutches through a simpler linkage in which the number of parts has been reduced and easier, faster response achieved through the use of 19 anti-friction bearings. In addition, the hoist and drag shoe type clutches have been redesigned to include an improved dead-end linkage that eliminates all adjustment at the dead end of the shoe and a new spring-loaded live end which not only reduces operating effort but also reduces adjustment frequency. Crawler machines in Thew-Lorain's ½- and ¾-yd classes also are equipped with hydraulic power controls to cover engagement and release of the turntable swing lock to hold the turntable against side motion during travel, release of the tread locking pawls, shifting of jaw clutches for selection of swing or travel and steering the crawler

in either direction. All may be effected with the turntable in any position of swing through the use of four short-throw, plastic knob levers accessibly mounted in a manifold at the right of the operator.



TRACTOR-SHOVEL CAPACITY UP

The entirely new Model HA Hough "Payloader" tractor-shovel has twice as much lifting, digging and carrying capacity as its predecessor. The bucket has been increased 16½%, providing a payload capacity of 18 cu ft and a struck-load capacity of 14 cu ft. Productive capacity has been increased from 50 to 100% and the maximum dumping height has been increased 18%, yet in spite of these increases, the new "Payloader" is a more maneuverable machine with a shorter turning radius than the former model, the maker reports. An entirely different bucket arm design permits exceptional breakout action of the bucket and 40-deg tipback, making it possible to carry heaped loads at a lower level and thus providing greater stability and better operator vision. Among the various other features cited by the maker is the combination or torque-converter drive and full-reversing transmission to assure fast operating cycles and ease of operation. Literature offered by the Frank G. Hough Co., Libertyville, Ill.



GROOVED END VALVES SPEED PIPING INSTALLATION

The new grooved-end valve, developed by the Lunkenheimer Co., Cincinnati, Ohio, for use with all types of standard grooved couplings, features extremely close tolerances that assure a perfect fit of the coupling over the grooved end of the valve body for a resulting connection that is rapidly installed and leakproof, yet flexible enough to allow deflections of several degrees in any direction, the maker reports. It is said to be particularly useful where pipe must be laid on the ground, over uneven terrain, in either temporary or permanent installations. In mining applications, the new valve is

employed in air and water lines, drainage lines and pumps, as well as hydraulic stripping installations.



HEAVY DUTY BULLDOZER

The Eimco 105 tractor, announced about a year ago with a loading attachment, now is available for bulldozer, winch or other attachments. Featuring various "firsts" in design and construction as originally announced, the 105 now is equipped with a 120-hp diesel engine with matched torque converter for smooth, balanced power to meet load requirements and is designed heavy enough to carry the additional weight of attachments and to take excessive loads at unusual angles, the company reports. Eimco tractors equipped with bulldozers weigh approximately 18 tons and are available with track width of 24-in., to provide low ground pressures in soft unstable areas. Both straight- and angle-dozer blades are available for hydraulic operation. Maximum operator visibility and the immediate response of the machine to the controls permits working in closer quarters and with greater safety, it is said. The Eimco 105 tractor with bulldozer develops 32,300-lb drawbar pull, with a maximum of 45,000 lb for zero track slippage, and torque converter is standard equipment on all units. Details from The Eimo Corp., Salt Lake City, Utah.

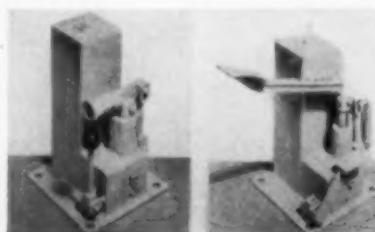
LONGER DYNAMITE CARTRIDGES

Its new "King-Size" dynamite cartridges now are commercially available in four lengths, and small diameters, reports the Explosives Dept., Hercules Powder Co., Wilmington, Del. The cartridges make possible more uniform fragmentation in the deeper blastholes now being used and also effect substantial savings in time and labor in loading blastholes, the maker points out. The commercial production of "King-Size" cartridges has been made possible through the design and development by Hercules of a new machine for packing cartridges in small diameters. All Hercules cartridges now are available in lengths of 24, 20, 16 and 12 in., and in diameters of 1 $\frac{1}{4}$, 1 $\frac{1}{2}$, 1 $\frac{3}{4}$ and 2 in. The conventional 8-in cartridge will continue to be available.

HIGH-STRENGTH WIRE ROPE DOUBLES SERVICE LIFE

A new high-strength wire rope, at least 15% stronger than the best grade of wire rope now being manufactured, has been announced by the wire rope division of American Chain & Cable Co.,

Wilkes-Barre, Pa. Representing the most important change in the characteristics of wire rope in 35 yr, according to the manufacturer, the new rope is expected to simplify the use of wire rope generally and to permit lighter weight equipment to be designed at lower cost. An average tensile strength of 300,000 psi has been achieved by the use of special, precise-analysis high-carbon steel wire and improved processing, and tests have shown service life more than double that of existing cables, it is said. The preformed rope, to be known as VHS—designating very high strength—will be marketed by both the Hazard Wire Rope and American Cable Div., with present diameters ranging from $\frac{1}{2}$ to 2 in. In addition to greater tensile strength, VHS cable is more wear-resistant and will keep its shape under pressure. It has greater fatigue resistance than improved plow steel, is tougher, and resists plastic deformation or the tendency to become "hide bound," it is reported. A special new lubricant is used which is designed to last for the life of the rope. Field tests of VHS drag lines and shovel hoist ropes have been particularly impressive, with a definite decrease in breakage due to shock and misuse, the company states. The new cable also is being supplied for scraper ropes used in construction and for slusher ropes used in underground mining. Full data from ACCO.



TWO-SPEED HYDRAULIC PUMP

A new principle of automatic change-over from high speed, low pressure to low speed, high pressure in hydraulic pump operation has been announced by Star Jack Co., Inc., 420 Lexington Ave., New York 17. Its "Hi-Lo" two-speed concentric piston pump, made entirely of steel, is available for hand and foot operation, activated by a single lever or pedal. Hydraulic rams are speedily raised until a predetermined internal pressure is reached in the system, when the job is taken over automatically by the specially designed high-pressure concentric piston which generates as much as 10,000 psi, the maker says.

NEW PLASTIC PIPE

The Crane Co., 836 S. Michigan Ave., Chicago 5, Ill., has added two more products to the more than 40,000 items now manufactured. The new additions are polyethylene plastic pipe and modified polystyrene insert fittings for industrial, plumbing and other use. Initial production of plastic pipe is limited in size from $\frac{1}{2}$ to 2 in., with dimensions in accordance with Commercial Standards CS 197-54. Crane's modified polystyrene insert fit-

tings include insert ells, tees, couplings and adapters. Full details from Crane.

LOW-COST TRUCK TIRE

A new low-cost highway truck tire, the B. F. Goodrich "Express," has been announced by the Tire & Equipment Div., B. F. Goodrich Co., Akron, Ohio. The new tire is designed to meet the needs of delivery truck operators and small fleet operators who need a good quality tire at low cost, the company reports. Available in 18 sizes and ply ratings, ranging from 7.00 x 15 6-ply to 10.00 x 22 12-ply, the Express is expected also to serve large, over-the-road haulers who need a low-priced tire for trailer wheels, the maker points out. Tread design of the new tire has the conventional five-rib design of the type used on the majority of truck tires and will deliver maximum mileage at low cost while affording excellent traction and skid resistance, it is said.

LONGER ROPE LIFE WITH NEW-TYPE WIRE ROPE

Developments in wire manufacture and rope fabrication now permit it to announce a new line of wire ropes, with steel cores, having 15% greater strength than the strongest grade marketed heretofore, reports the John A. Roebling's Sons Corp., Trenton 2, N. J. In the past, one of the obstacles to rope of higher strength was a proportionate decrease in other qualities as the strength went up, the company points out. Featuring higher resistance to wear from bending and abrasion, the new rope not only has higher strength, but will also deliver longer rope life, it is said. The new rope will be manufactured primarily in preformed constructions, in rope sizes ranging from $\frac{1}{4}$ to 3 $\frac{1}{2}$ in. Industries benefiting will be those which use a wire rope with independent wire rope core, such as construction, oil, logging and mining. The new ropes are applicable for use on shovels, draglines, wagon-scrapers and the entire gamut of earth-moving equipment, rotary rigs, cat arches and chokers, slushers and mining machines, etc. Full data from Roebling.

NEW-TYPE INSULATED WIRE PERMITS MOTOR UPGRADING

Magnet wire insulated with "Alkanex" is now being produced by General Electric's Wire & Cable Dept., Bridgeport 2, Conn. A recent development of the G-E Research Laboratory that is regarded as a major development in electrical insulating materials, Alkanex is a thin-film, polyester-type of insulation with high-heat-resistance properties as well as excellent resistance to abrasion and solvents. Alkanex magnet wire is the toughest high-temperature film-insulated wire yet developed for use in motors, transformers, and other electrical equipment operating above 105 C, G-E reports. According to the company, this new insulation will allow engineers to increase the horsepower of motors without increasing their size. For instance, motors once rated at 20 hp may

B.F. Goodrich



"We prefer the Universal tread over any other," mine superintendent says

Hour after hour, Roy J. Ault, superintendent of the Shasta Coal Corporation strip mine at Bicknell, Ind., sees giant tractor-trailers haul 32-ton loads of coal up out of the mine. B. F. Goodrich Universal tires work so well on rock-covered roads that Ault says they are preferred over other makes.



EN ROUTE TO THE TIPPLE B. F. Goodrich tires "hold the road better", Shasta Coal Corp. reports.

The Universal tread is specially compounded to resist rock cuts and bruises. Wedge-shaped cleats defy dangerous skidding and sliding.

All-Nylon cord body

B. F. Goodrich Universal tires have an all-nylon cord body. Nylon is stronger than ordinary cord materials, with-

stands double the impact. All-nylon Universal tires outwear the tread, can still be recapped over and over!

Under the tread is the B. F. Goodrich nylon shock shield. Layers of strong nylon cords stretch together under impact to protect the tire body. Result: Universal tires wear longer; more tires can be recapped.

See all-nylon Universal tires (size 12.00 and larger—smaller sizes in rayon or nylon) at your B. F. Goodrich retailer's. The address is listed under Tires in the Yellow Pages of your phone book. Or write *The B. F. Goodrich Co., Tire & Equipment Division, Akron 18, Ohio.*

Specify B. F. Goodrich tires when ordering new equipment



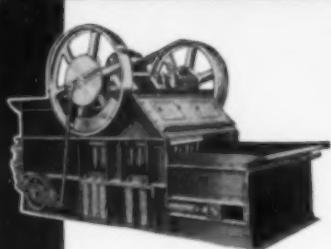
UNIVERSAL TIRES are non-directional, can be mounted in any wheel position. You need fewer spares.



America's most complete line of CRUSHING EQUIPMENT

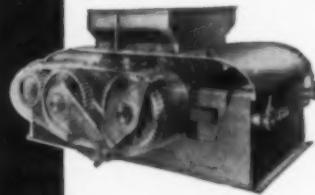
AVAILABLE FROM STOCK

AND ONE-SHOT PURCHASES



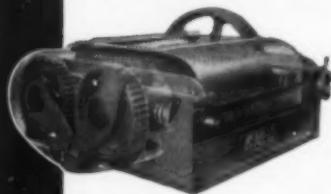
McNally Norton Vertical Pick Breaker

50% less fines when reducing lump to egg and stove sizes.



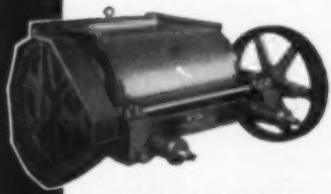
McNally Double Roll Gearmatic R. O. M. Breaker

Built in tonnage ranges from 750 tph to 1400 tph. Full floating Gearmatic drive.



McNally Gearmatic Stoker Coal Crusher

This unit offers three prime advantages:
High volume production, plus accurate sizing, plus low percentage of fines.



McNally Single Roll Crusher
Universal application. 20", 24" and 36" dia. rolls.

For immediate action on complete information write, wire or call . . .

M^c

★ Pittsburg, Kansas ★
★ Wellston, Ohio ★

be upgraded to 25 hp or more, thus permitting them to carry a much bigger load. It is estimated that 90 to 95% of all motors could operate in the Class "B" high-temperature range for which Alkanex is designed. Alkanex magnet wire now is available in round sizes No. 13 Awg through No. 26 Awg with single and heavy-wall film thicknesses. Full details from G-E.

SALT HAS RUST INHIBITOR

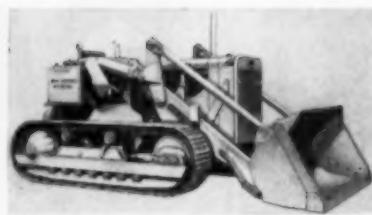
A new antifreeze salt with an efficient rust inhibitor for the protection of equipment has been announced by the International Salt Co., Inc., Scranton, Pa. Called "Sterling Antifreeze Salt-Inhibium Treated," the new product is said by the company to reduce salt brine corrosion by as much as 90% and make salt brines less corrosive than ordinary tap water. International Salt is currently adding inhibium to 100-lb bags of both granulated and FC size rock salt at a modest premium price. Said to be effective in any brine from the weakest to the fully saturated, Inhibium contains no chromates, alkalies or acids and is odorless, non-poisonous and nontoxic. It works by dissolving in the water along with the salt, excluding oxygen, the real cause of corrosion, from all metal and oxide surfaces by covering them with a microscopically thin complex phosphate coating. This also insulates metal from galvanic currents which cause electrochemical corrosion.

HIGH-STRENGTH ALUMINUM-STEEL

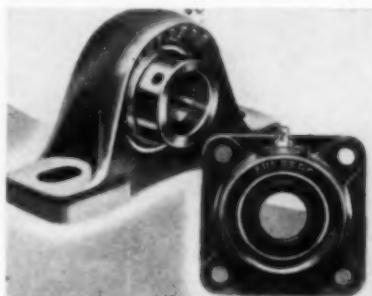
Armco Steel Corp., Middletown, Ohio, has announced a new type of aluminum-coated steel, known as Armco Aluminized Steel (Type 2), that is said to combine the corrosion-resisting and heat-reflecting qualities of aluminum with the strength of steel. Tested for prefabricated buildings, silos, tanks, roof decks, etc., the new aluminum-coated sheet is said by the company to be greatly superior to zinc coatings and field tests indicate that it should outlast the common hot-dipped galvanized coatings in atmospheric service by at least three to one. General reaction of Type 2 Aluminized to atmospheric exposure is the same as that of solid aluminum, it is said. According to the company, Type 2 Aluminized has the same high reflectivity of radiant heat as aluminum; a much better resistance to fire damage than aluminum or galvanized steel; and a coefficient of expansion only half of that of aluminum. Cost is said to be generally lower than aluminum of equal thickness, with substantial savings being possible in the heavier gages, and less than the cost of galvanized steel plus one field coat of paint.

MORE POWERFUL TRACTOR-SHOVEL

A new, more powerful 2-yd Model HD-9C tractor-shovel, with design modifications and construction improvements offering greater productivity, longer life, maintenance simplicity, ease of operation and maximum visibility, has been an-



nounced by Allis-Chalmers Mfg. Co., Tractor Div., Milwaukee 2, Wis. The new HD-9C produces 100 net engine hp and 82 drawbar hp and simultaneously handles maximum traction and hydraulic pump power requirements with complete ease, it is said. Other features cited by the maker include a new ceramic master clutch lining that reduces lever pull and increases clutch life even on the toughest jobs, a completely new bucket design that makes digging, loading, and dumping easier, faster and cleaner; a new hydraulic system that practically eliminates external hoses, fittings and hardware; new-type shovel side frames mounted on the tractor rigid beam with wedge blocks to maintain rigidity; and new booms which are 50% stronger.



NEW-DESIGN PILLOW BLOCKS

Its completely new "SP" series of ball-bearing pillow blocks and flanges incorporates a total of 10 new features, according to Ahlberg Bearing engineers. Offering greater bearing capacity, increased alignment range, and interchangeability to a greater degree than was formerly possible, the improvements include a reinforced housing, improved shaft lock, and dustproof seals. The new SP pillow blocks and flanges are made in shaft sizes from $\frac{3}{4}$ to $2\frac{1}{2}$ in. Catalog with details from Ahlberg Bearing Co., 3025 W. 47th St., Chicago 32, Ill.

FIRE-FIGHTING MASK

A newly-designed MSA mask which supplies fire fighters and industrial workers with oxygen or air as desired is available in two models, the Air-Mask and the O₂-Mask. Either combines a supply of air or oxygen with a demand regulator to provide 30-min service in highly toxic or oxygen-deficient atmospheres. A back-mounted cylinder, supported by a light-weight metal frame, is held by nylon harness to the wearer's body. The entire mask weighs only 30 lb and it can be put in operation in only a few moments. Full details are included in Bulletin 0105-5, available from Mine Safety Appliances Co., 201 N. Braddock Avenue, Pittsburgh 8.



Look
boss
no
loss *

1. **ELIMINATE WINDAGE LOSS**—that result in lost weight claims and air pollution complaints
2. **MAINTAIN QUALITY**—Permatreat reduces deterioration from weathering
3. **DUST PROOF—ODORLESS**—Permatreated coal insures dustless delivery and handling, odorless storage and burning
4. **DECREASE WATER ABSORPTION**—Permatreated coal repels water and coal unloads twice as fast
5. **IMPROVE BTU VALUE**—Add 300,000 BTU per ton for each 1% reduction in moisture
6. **AVOID CORROSION**—Non-corrosive Permatreat can't pit or corrode stoker equipment
7. **FREEZE PROOF**—Permatreated coal resists freezing and eliminates frozen car pockets
8. **CONTROL BULK DENSITY**—Permatreat insures uniform coke production and quality



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Coal treated with

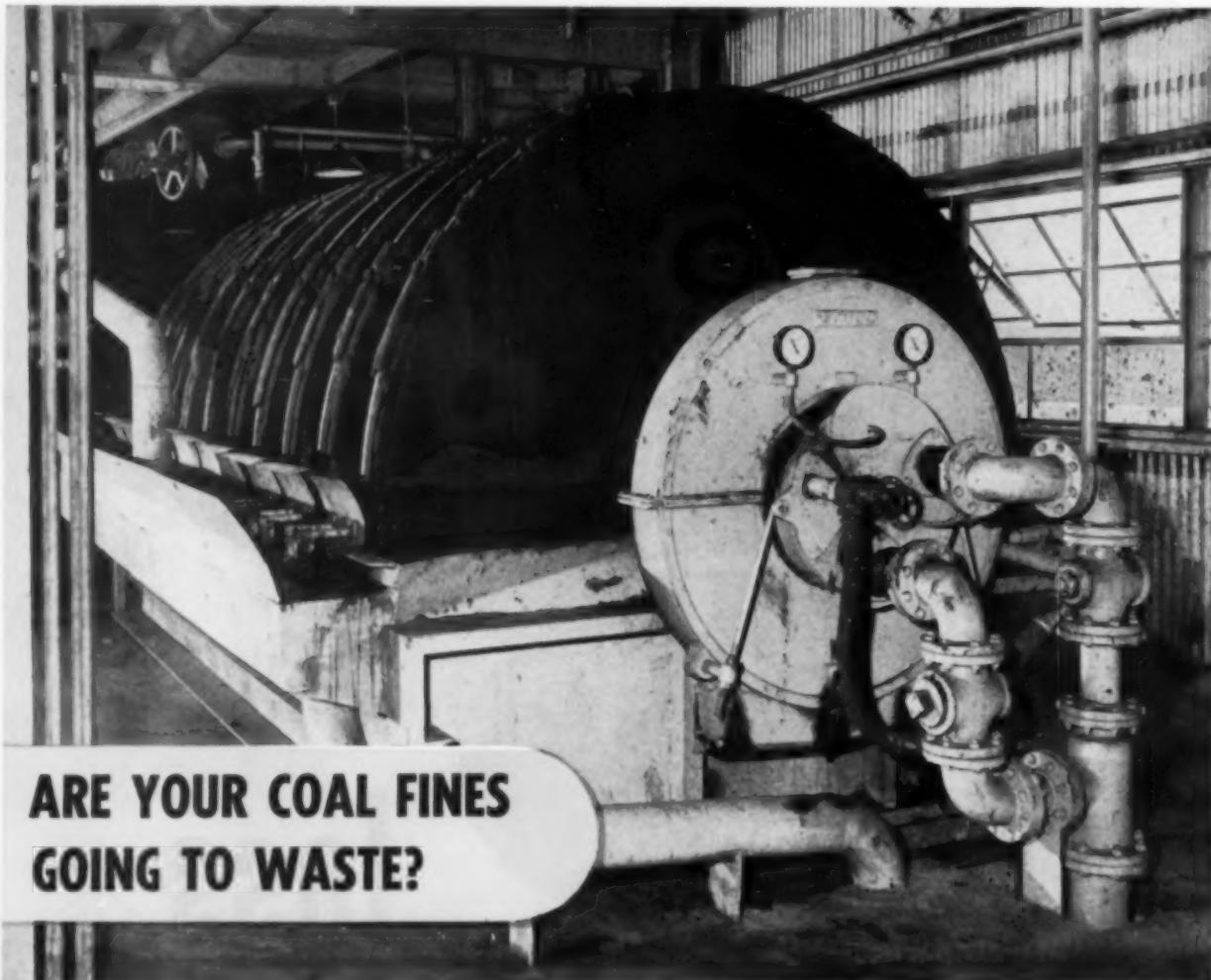


"lasts the life of the coal"

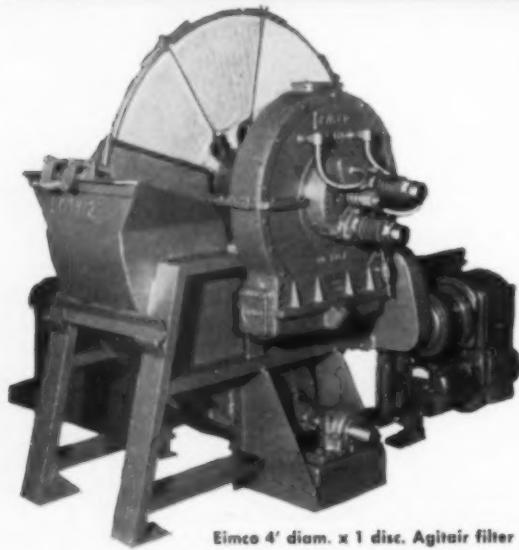
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ASHLAND OIL & REFINING COMPANY
Ashland, Kentucky

Special Advisory Service available from nationally
recognized authorities on coal treatment.



ARE YOUR COAL FINES GOING TO WASTE?



Eimco 4' diam. x 1 disc. Agidisc filter

Coal fines are an economical source of revenue, they can be reclaimed and will pay in a short time, for all equipment necessary to make the installation.

Several flow sheets employ Eimco filters as the dewatering equipment in plants set up to reclaim the fine coals. Eimco filters are best because they do the job for less money.

Eimco filters will dewater greater tonnages per square foot of filter area per hour. They are simple in design and built for long periods of continuous operation with a minimum of attention. They produce a thick, evenly distributed cake formation, uniformly dried to low moisture content. Eimco filters have a clean discharge of the cake which provides much greater bag life and many other advantages.

Write for complete information on fine coal dewatering with Eimco Agidisc filters.

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

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You Can't Beat An Eimco!



IMPROVED CRAWLER TRACTOR

The new OC-12 industrial crawler tractor announced by the Oliver Corp., 400 W. Madison St., Chicago 6, is completely new in design and engineering, and features various advancements in power, operating economy and handling ease. Two engines are available for the OC-12, a full diesel with 45.1 drawbar hp and a gasoline unit with 44.3 drawbar hp. Special attention has been given to operator convenience and comfort in the

tractor, and maximum operator visibility is provided on all sides, it is said. The OC-12 is available in two track-gage widths, 44 and 60 inch, and two track lengths. Balanced design and controlled differential steering provide excellent handling ease with mounted equipment. Allied equipment includes a 1-yd hydraulic loader and hydraulic bulldozer. The transmission has four speeds forward and two reverse. Catalog offered by the Oliver Corp.

IMPROVED CRANKCASE LUBRICANT

D-A Lubricant Co., Inc., Indianapolis 23, Ind., has announced an improved crankcase lubricant developed especially for certain supercharged diesel engines. The new D-A "Extra-Treated" diesel oil has been qualified as a Caterpillar Superior Lubricant Series Two and has replaced D-A's former qualifications. The new product utilizes a new type of additive which has increased the detergency reserve approximately three times. Details from D-A Lubricant.

FREE BULLETINS AVAILABLE

FLOTATION — "Mineral Dressing Notes" No. 21, "Froth Flotation," is available from the Mineral Dressing Dept., American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y. This bulletin is a concise, authoritative study of flotation from its early history to present-day chemistry and applications. It has an extensive bibliography as well.

STRIPPING MACHINERY — How can mine operators cut stripping costs 50%? Is there an engine that will deliver trouble-free performance, few adjustments and repairs, low operating costs, long life, and steady power? These and other questions are discussed in a new booklet titled "Modern Machines for Mines, Pits and Quarries" published by Caterpillar Tractor Co., Peoria, Ill. It contains on-the-job photographs and job descriptions of track-type tractors, shovels, motor graders, wheel tractors, scrapers, side-dump trailers and engines on mining operations throughout the world.

DIESEL ENGINES — A new brochure describing the operation of General Motors "6-110" diesel engines and illustrating industrial and marine models from 200 to 575 hp is offered by Detroit Diesel Engine Div., General Motors Corp., Detroit 28, Mich. Entitled "Power for Progress," the 32-p brochure covers features of design, specifications and power curves of single-, multiple-engine and torque-converter units and their application in various types of equipment.

POWER UNITS — 18 heavy-duty power units—said by the maker to be the biggest selection in the industry—are described in a new catalog published by the International Harvester Co. Offering a range of from 16.5 to 200 net hp, the units fall into three groups: 4-cylinder carbureted units, 6-cylinder carbureted

units, and diesel units, both four and six cylinder. Full specifications for application of the units to new installations or as replacements for existing power are discussed. Available from the Consumer Relations Dept., International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill.

HOSE CHECKLIST designed for maintenance men and other users of industrial rubber hose interested in longer hose life and better performance is offered by the Thermoid Co., Trenton, N. J. Printed on stiff cardboard for mounting, the 11-point checklist also highlights four common abuses of hose with drawings.

COAL-CHEMICAL MOVIE — How once wasted smoke from coke ovens now is converted into a wealth of basic chemicals used in the manufacture of aspirin, paints, fertilizers, wood preservatives, plastics, nylon, sulphur drugs and countless other articles is the subject of a dramatic motion picture, "Waiting Harvest," just released by U. S. Steel Corp. "Waiting Harvest" traces the development of coke-making operations from the early industrial era through to modern coke ovens. The 23-min film is available to service clubs, churches, civic, fraternal and other associations on a free loan basis from the Motion Picture and Visual Aids Section, Advertising Div., U. S. Steel, 525 William Penn Pl., Pittsburgh 30, Pa.

LEVEL INDICATORS — Four models of Convair Bin-Vue indicators, designed for a wide range of applications in bins, conveyors, chutes, etc., with dry and wet materials, are described in bulletin from Convair, Pittsburgh, Pa. Dimension drawings, operating features and application possibilities are provided for each model.

BUILDERS-PROVIDENCE
DIVISION OF B-I-F INDUSTRIES, INC.
BUILDERS IRON FOUNDRY & PROPRIETORS, INC. • OMEGA MACHINE CO. • BIF METERS FEEDERS CONTROLS

Builders Conveyoflo is unsurpassed for accurate weight-metering of belt conveyor flows. Pneumatic system gives full-range metering with minimum vertical belt deflection. Compact — no overhead framework or complicated lever arms. For Bulletin 550-H4A, write Builders-Providence, Inc., 395 Harris Avenue, Providence 1, Rhode Island.

Super Scale for Conveyors

The strongest rack bar makes the toughest jack



A ratchet jack like the Duff-Norton all-purpose 516 MT is no stronger than its rack bar, the notched steel "heart" that moves up and down holding the load. The forged steel rack bar on this 5-ton capacity coal mining jack is stronger and tougher than the rack bar on any other ratchet jack of this type. It's *stronger because it's larger!*

Next time you see a Duff-Norton jack, examine the rack bar; you'll notice it's oblong like this ■■■. Then look at the rack bar on any other make ratchet jack. It's smaller, like this ■■■.

So get the most and best for your money with a Duff-Norton Jack.

Ask your distributor for information about Duff-Norton Jacks for coal mines. There's a jack for every lifting, pulling, and pushing job . . . or write the world's oldest and largest manufacturer of lifting jacks for your copy of "A Handy Guide for Selecting Duff-Norton Mine Jacks." Ask for bulletin Ad 10-J, The Duff-Norton Manufacturing Co., P.O. Box 1889, Pittsburgh 30, Pennsylvania.

Long a favorite with coal miners is the 516 MT. It can raise 5 tons up to 9½ inches, is only 16 inches high when closed, has the famous oblong rack bar for greater strength and dependability.

DUFF-NORTON Jacks

"Giving Industry A Lift Since 1883"

CRANE-SHOVEL—12-p Bulletin 15-B-TC-1 describing the Bucyrus-Erie 15-B transit crane (15-ton rated capacity) includes specifications and working ranges, plus brief, easy-to-read description of the machine's major advantages. The 15-B transit crane is a mobile, ¼-yd crane-excavator readily convertible to shovel, dragline, clamshell or dragshovel for handling a wide range of lifting and excavating jobs. From Bucyrus-Erie Co., S. Milwaukee, Wis.

STOCK GEARS—New 200-p catalog offered by Universal Gear Works, Inc., 1301 E. McNichols, Detroit 3, Mich., provides specifications and prices for over 8,000 stock items, including gears, sprockets, chains, splines, etc. Considerable space is devoted to the 1800 Series Universal drilling units, dust collectors, coolant systems, grinders, and other related manufactured items.

STORAGE METHODS—"How to Double Your Warehouse Capacity" is the title of a new 16-p brochure released by The Frick-Gallagher Mfg. Co., Wellston, Ohio. Purpose of the booklet is to show that while there can be no single fixed formula for greater warehouse economy, sizable savings of space and time are nearly always possible through better use of existing facilities and, where advisable, through use of special storage equipment. It discusses the science of proper space utilization and the correct use of special-purpose storage equipment. Ask for Catalog 700.

EXCAVATOR-CRANE—20-p Bulletin 1235 describing the Hyster Hystaway ½-yd excavator-crane mounted on new or used Caterpillar D6, D7 or D8 track-type tractors is available from the Hyster Co., 2902 N. E. Clackamas, Portland 8, Ore. It explains on-the-job advantages of the Caterpillar-built tractor with dozer blade and Hystaway which can be quickly converted to either shovel, backhoe, dragline, crane, clamshell or pile driver, along with operating features and specifications.

CENTRIFUGAL PUMPS—Bulletin 105-B recently issued by Aurora Pump Div., New York Air Brake Co., 629 Loucks St., Aurora, Ill., describes Aurora's Type O horizontal split-case, double-suction centrifugal pumps, with full operating details, specifications and a selection table. Recommended for municipal and industrial water supply or for handling circulating and wash water, chemical solutions and oils, the pumps are supplied in capacities to 4,600 gpm against heads up to 225 ft.

RUBBER LININGS—Bulletin describing the advantages and application of rubber lining to steel tanks, drums, pipes, valves, fittings and pumps, is being offered by the Protective Coatings Div., Metalweld, Inc., Scotts Lane & Abbottsford Ave., Philadelphia 29, Pa. Tables give the resistance characteristics of MW rubber lining to inorganic acids, salts and alkalies, organic materials and a wide group of miscellaneous materials. Details on the chemical-, abrasive- and



With a small supply of Aeroquip hose and fittings in the service truck, Mechanic Cliff Scarborough can make new hose lines right in the field.



This Aeroquip SOCKETLESS replacement line was made in a matter of minutes with no tools except a pocket knife for cutting the hose.

Field Assembly of Aeroquip Hose Lines Cuts Downtime for Wm. J. Muehlenbeck

Wm. J. Muehlenbeck of Saginaw, Michigan keeps a mixed fleet of earthmovers, scrapers and graders on the job with a minimum of downtime. Broken hose lines are replaced, on all makes of equipment, with new Aeroquip assemblies made right in the field! Aeroquip wire braid hose and reusable fittings fill the bill for all hydraulic and heavy-duty lines. For fuel, oil and air lines, Cliff Scarborough, Muehlenbeck mechanic likes Aeroquip's new SOCKETLESS fittings and hose that assemble extra fast by just pushing the hose on the fittings. You'll save time, too, by replacing broken hose lines right on the spot. Get the complete story from your distributor, or write us.

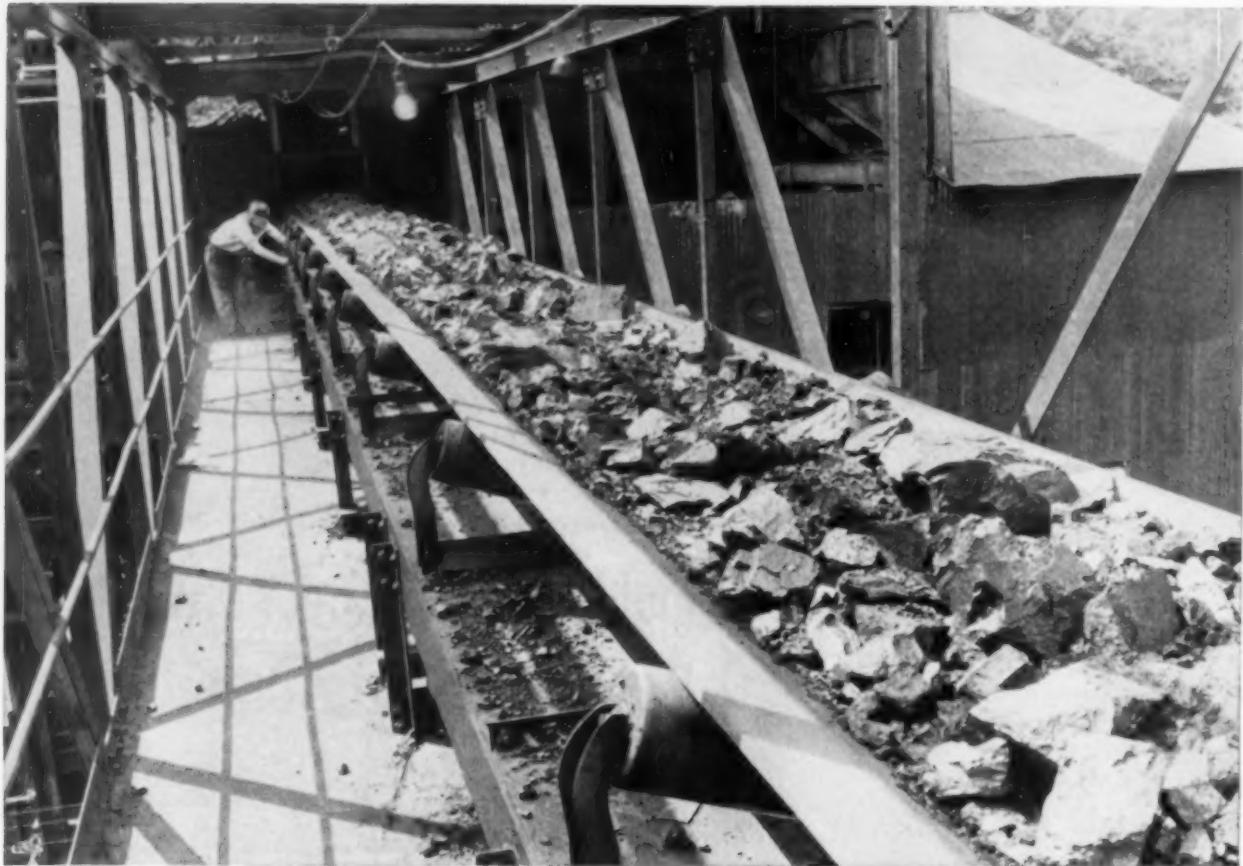


JUST PUSH THE HOSE ON IT STAYS ON
PATENT APPLIED FOR

 **Aeroquip**
REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A. AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD



Pittsburgh Coal Co. reports . . .

Installation of belt reinforced with Du Pont "Cordura" helps increase production 67% . . . reduces maintenance



Reinforced with Du Pont "Cordura", the 800-foot conveyor belt carries coal and rock to the hopper at the discharge end of the belt. From the hopper the coal and rock go to coal cars below.

Production has gone from 600 to 1,000 tons per hour since the installation of the fast-moving conveyor belt system shown above at the Montour #4 mine operated by the Pittsburgh Coal Company.

Reinforced with Du Pont Cordura* High Tenacity Rayon, the belt in this system carries coal and rock throughout rugged 100-hour work weeks. The company's Engineering Department recommended this belt, manufactured by the Goodyear Tire & Rubber Co., because of its long service life and the expectation of more tonnage. The company reports fewer men and much less maintenance are required since adopting a conveyor belt system of operation.

The extra strength of Du Pont "Cordura" permits a belt that's thinner yet stronger. And the low stretch of "Cordura" reduces costly downtime for take-up and resplicing.

Investigate the advantages of "Cordura" before ordering your next conveyor belt. Write for the names of suppliers . . . and send for free copy of the new booklet, "Mine & Quarry Facts About 'Cordura'". Address: Textile Fibers Dept., Room 11504, E. I. du Pont de Nemours & Co. (Inc.), Wilmington, Del.

*Reg. U. S. Pat. Off.

Du Pont *"Cordura"* High Tenacity Rayon
STRENGTH AT LOW COST



BETTER THINGS FOR BETTER LIVING... THROUGH CHEMISTRY

temperature-resistant qualities of rubber linings and the different types of linings available also are given.

PUMPS—Bingham Pump Co., 2857 N. W. Front Ave., Portland, Ore., offers an informative 16-p brochure "This Is Bingham Pump" describing its facilities and methods in manufacturing centrifugal, turbine, propeller, Hi-Press, condensate and vacuum pumps. It also offers a companion 32-p booklet, "A Technical Treatise on the Advancement of Centrifugal Pump Design," giving an engineering description of the "Bingham Double Volute" design.

STOCK AND PARTS LAYOUT—Booklet, "How to Solve Your Storage Problems," discusses how to set up stockroom facilities, surveying requirements and making floor plans, etc. It is offered by the Equipto Div., Aurora Equipment Co., 100 Prairie Ave., Aurora, Ill., to those planning the smaller stockroom layouts. For larger installations of steel storage equipment, the company offers the services of its factory-trained engineers in analyzing and planning stockroom layouts.

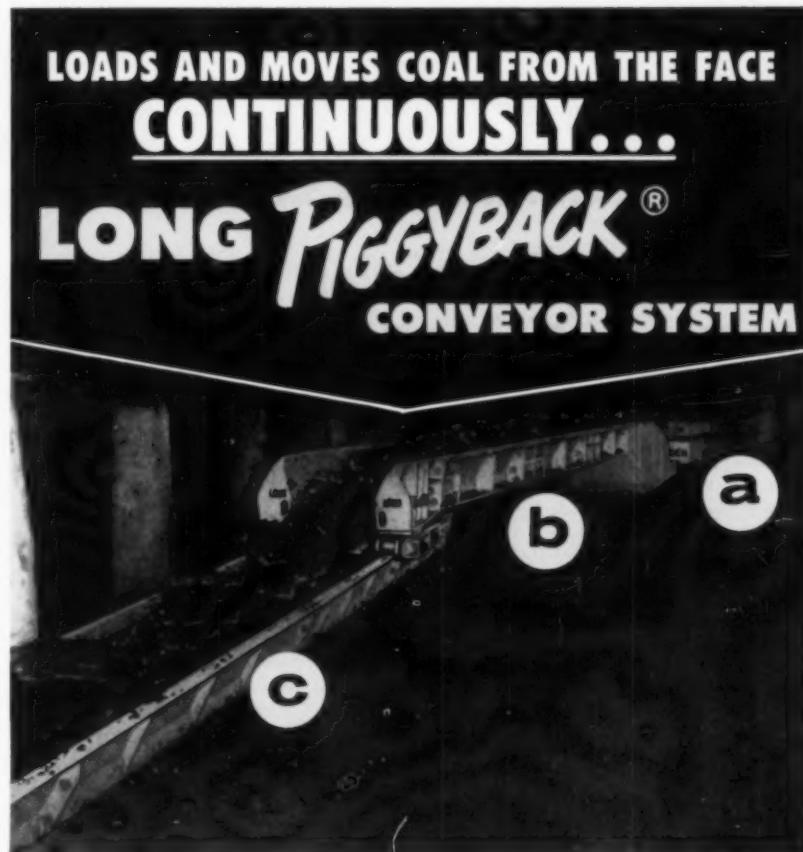
FLEXIBLE COUPLINGS—New pocket-size Ajax Selection Guide contains technical data, ratings, drawings, specifications, service factors and application information on Ajax rubber-bronze-bushed flexible couplings. Bulletin 57 from Ajax Flexible Coupling Co., Inc., Westfield, N. Y.

COMBUSTION GAS TURBINES for power generation and mechanical-drive applications are described in a revised Bulletin GEA-5516B offered by the General Electric Co., Schenectady 5, N. Y. Gas turbine-steam turbine cycles, mechanical-drive applications, design features, control and governing, generators, characteristics, dimensions and weights are among subjects covered.

PERFORATED METALS—New 114-p pocket-sized catalog, published by the Standard Stamping & Perforating Co., 3131 W. 49th Place, Chicago 32, Ill., is available to users including their company name in their request. The catalog covers data on a wide range of perforated metal, with actual-size illustrations of samples, helpful buying information, applications, manufacturing processes, etc.

ELECTRIC MOTORS—The Lima Electric Co., 192 Findlay Rd., Lima, Ohio, offers a new service brochure listing authorized Lima service stations, representatives and factory distributors all over the country, to enable customers to obtain prompt and efficient service on Lima motors anywhere in the United States.

STEEL PULLEYS—Bulletin from the American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29, Pa., describes manufacture and features of its precision-made steel pulleys for power transmission, material conveying, heating and other applications.



AS SIMPLE AS . . .

a **LONG Model 88 Pigloader***—the first loader designed specifically for Piggyback* Conveyor Mining—is a low-height, heavy-duty single motor machine capable of high-capacity operation. It automatically carries the receiving end of the Piggyback Conveyor along as it moves, loading into the Piggyback continuously. There are no costly delays waiting for "stop-and-go" transportation.

b **The LONG Piggyback Conveyor**—provides steady, uninterrupted haulage from the Pigloader to the LONG Room Conveyor. It rides freely back and forth (with movement of the Pigloader) on the pan line of the room conveyor. Wishbone pivots—one at each end of the Piggyback—make possible continuous operation at 90° angle breakthroughs.

c **The LONG Room Conveyor**, which receives coal from the Piggyback and moves it on to the gathering conveyor, has been especially designed for this continuous haulage system. Equipped with such exclusive LONG developments as rugged "Superflite" chain, extra strong flights and deep "whispering joint" pans, LONG Room Conveyors have proved their ability to handle the high tonnages of Piggyback mining. Further, they permit driving of extremely deep rooms.

With proved, practical Piggyback Conveyor mining, you can count on greater production, lower operating costs and increased profits. Six hours or more loading time per shift is not unusual, and the initial investment for the Piggyback system is surprisingly low.

*Trade Mark

For complete details or a demonstration, write us today!

The **LONG**
OAK HILL, W. VA. *Company*

NEWS ROUND-UP

Oil-Import Restriction Out As House Okays Trade Act

THE COAL INDUSTRY'S DRIVE for legislative restriction on the importation of foreign residual oil suffered a setback Feb. 18 when the House passed by a vote of 295 to 110 H.R. 1, the administration's bill to extend the Reciprocal Trade Agreements Act and further lower some tariffs. The House passed the bill exactly as approved by the House Ways and Means Committee, which on Feb. 10 had reported the bill out by a vote of 20 to 5 substantially without change from its original form.

Requests for protection of the coal and domestic oil-producing industries by restriction of residual and crude oil imports to 10% of the annual U. S. requirements, actively pushed by the coal industry, independent oil producers and other groups, were rejected by the committee.

As debate on the bill began on the House floor Feb. 17, opponents of the bill were momentarily successful in a move to open it up to amendments from the floor, but in a second vote the "closed rule," permitting only committee-sponsored amendments on the floor, was passed by only one vote (193 to 192), the closest margin of decision on any major piece of legislation since August, 1941, when the House approved extension of the Draft Act by a vote of 203 to 202. Passage of the bill came on the second day of debate, following several attempts to limit or revise its provisions.

Opponents of the bill, cheered by the show of strength in the preliminary House voting, planned to continue their fight in the Senate and reportedly were still hopeful of adding protective amendments during consideration by the Senate. Its backers, however, foresaw quick action in the Senate and final passage without major change.

"Coal is a basic commodity that cannot be ignored if the United States is to remain strong," Tom Pickett, executive vice president of the National Coal Association, told the House Ways and Means Committee during its hearings on the bill. Mr. Pickett was one of numerous witnesses appearing on behalf of coal and allied industries, including more than 20 Congressmen from coal-producing states, who emphasized how unrestricted residual oil imports are damaging the coal industry and the threat to national defense if the industry is not maintained so that it can readily respond to the requirements of defense mobilization.

L. Newton Thomas, president of the

Carbon Fuel Co. and chairman of the Foreign Oil Policy Committee, told the committee in a statement that failure to impose a quota limitation "can only result in fuel inadequacies, in time of emergency, which would be beyond repair, and the wholly unjustifiable weakening of a basic American industry."

Others appearing for the coal industry included: Joseph H. Moody, president of the Southern Coal Producers' Association; Thomas Kennedy, vice president, UMWA; Walter K. Scherer, president, American Retail Coal Association; and

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Frank W. Earnest Jr., president, Anthracite Institute. Support for the quota was expressed by representatives of independent oil producers, railroads, and railroad labor. Representatives of the governors of 10 coal-producing states also attended the hearings, including Sen. Matthew M. Neely (D., W. Va.), who read a statement into the record on behalf of Gov. Marland of West Virginia.

Numerous Protests on Minimum Wage Prolong Labor Dept. Hearing

Opposition by numerous non-union coal operators in various states took the hearing on the proposed determination of a prevailing wage for the bituminous coal industry into its third week of testimony last month. The hearing before Department of Labor Examiner Clifford P. Grant began in Washington Feb. 1 and, following a recess during the week of Feb. 7 to permit collection of more evidence by opposing counsel, resumed again Feb. 14, continuing throughout that week and into the week of Feb. 21.

The hearing is part of the procedure to determine the prevailing minimum wages in the bituminous coal industry for application under the Walsh-Healy Public Contracts Act, which authorizes the Secretary of Labor to set minimum wages and labor standards for all workers employed in the manufacturing or furnishing of materials and supplies under government contracts in excess of \$10,000. It was initiated by Secretary of Labor Mitchell in response to requests from John L. Lewis, president of the UMWA; George H. Love, president, Pittsburgh Consolidation Coal Co.; and A. R. Matthews, president, Pocahontas Fuel Co., Inc. The testimony will be certified without recommendation by Examiner Grant to the Secretary of Labor who will make the final determination.

Primary target of the action is the Tennessee Valley Authority, which has been charged with depressing the industry in general by purchasing coal from mines operating with substandard wage scales and safety conditions. Use of the



"DOGHOLES IN THE MOUNTAINS"
pay non-union miners a "miserable wage," reported Mr. Lewis during Labor Department hearing last month

Federal Coal Mine Safety Code, or higher state standards of health and safety, to determine compliance of coal mine operators with the Act was put in effect by action of the Secretary last December.

The Nation "would have a pushcart economy" if it followed the example of the TVA which is a "tremendous offender



Marion dragline at the Fairview Collieries, Inc., Flamingo Mine, Fairview, Illinois, lays fill for new coal road. Dragline uses Standard greases.



STANDARD OIL COMPANY
(Indiana)

Flamingo Mine uses CALUMET Viscous Lubricant for Marion dragline spur gear

A No. 7200 Marion dragline at the Flamingo Mine, Fairview, Illinois, is a busy piece of equipment. Its jobs include removing overburden and laying fill for roadbeds. These are rugged chores carried on in all kinds of weather under tough operating conditions. To keep this dragline operating winter, summer, spring, fall, in dust, dirt, and mud, Flamingo Mine lubricates the vital spur gear with CALUMET Viscous Lubricant.

CALUMET Viscous is an adhesive lubricant manufactured specifically for such tough service as this spur gear job. It will not chip off in winter temperatures nor throw off during summer heat. It has the ability to withstand heavy shock loads, has

high load carrying capacity. Its unique properties make it both heat and water resistant.

CALUMET Viscous Lubricant can be applied, without heating, by either gun, brush or swab, without scraping off previously used lubricants — two important advantages.

There is a complete line of CALUMET Viscous Lubricants. They are just a few of the extensive catalog of greases and lubricants available from Standard Oil. Like to know more about them? In the Midwest call your nearby Standard Oil lubrication specialist. Or contact: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Ill.



R. E. Wright, Standard lubrication specialist, inspects Marion dragline spur gear. Before entering field service work Bob got his engineering degree from Michigan School of Mines. He has completed Standard's Sales Engineering School. Customers find this background and experience pay off for them.

that has consistently violated the spirit of the Act," declared Mr. Lewis in opening the testimony. He accused the agency of using its influence to force down pay in non-union mines to "starvation" levels and said that in its attempts to make a better cost showing for the electricity it produces in comparison with privately owned utilities, TVA "has ignored every humane consideration."

The TVA has enough advantages over private enterprises without having to pay such low prices, Mr. Lewis said, and its low-cost buying forces other big utility systems to refuse to buy from higher cost, union-organized mines, thus upsetting the entire industry. His objective, Mr. Lewis said, was to "compel the TVA to pay at least a price for their coal that will pay the prevailing minimum wage." Non-union employees at "dog-holes in the mountains" were paid a "miserable wage," worked under conditions where ventilation does not exist and lived "on corn meal and fat hog meat," Mr. Lewis declared.

Witnesses for the petition following Mr. Lewis included several other UMWA officials; George A. Lamb, manager of

business surveys, Pittsburgh Consolidation Coal Co.; Hugh R. Hawthorne, general counsel for Pocahontas Fuel; and several other industry representatives. During his testimony, W. A. Boyle, assistant to Mr. Lewis, presented statistics showing that the 5,368 signatories to the UMWA contract in 1953 produced 84.39% of the total bituminous production and had 84.28% of the total employees in 1953.

Opposing testimony was presented by Wallace Cohen, an attorney representing some 518 operators in southwestern Virginia; Marvin P. Sadur, representing the Central Pennsylvania Open Pit Mining Association and the Independent Coal Producers' Association; individual operators and representatives of others from Virginia, West Virginia and Kentucky. While varying to some extent in detail and content, opposition testimony sought to show that most of the production from their respective areas was non-union, that high-cost operation made adherence to the scale impossible, that many of their workers actually earned more than union miners, and that many union mines were not in fact sticking to the union scale, among other points.

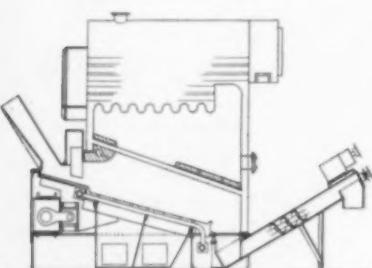
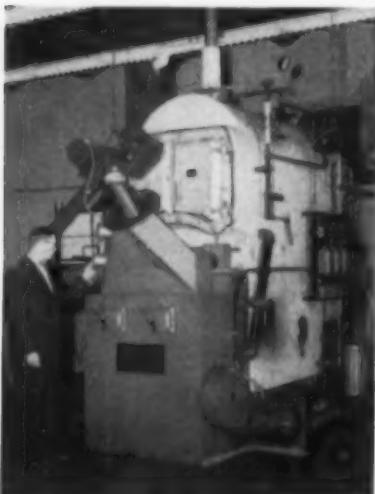
BCR Develops New Automatic Coal-Fired Steam Generator Package

DEVELOPMENT of an automatic steam generator, successfully combining the economy of coal with high efficiency and convenience in compact and automatic equipment, was announced Feb. 15 by Bituminous Coal Research, Inc. The automatic coal-fired unit has been designed for commercial and small industrial applications and is expected to have a size range from 1,500 to 20,000 lb of steam per hr at pressures up to 300 psi. It will be applicable for space heating, process hot water and high-pressure process steam installations.

Objectives of the BCR research program in the design of the unit included development of: (1) a compact, efficient boiler fired by a stoking device that burns coal smokelessly and permits con-

tinuous mechanical ash removal; (2) a stoker-boiler unit that operates automatically through a wide load swing, reduces or eliminates manual rekindling of the fire, and provides for automatic start from a banked or idle condition; (3) automatic ash-removal equipment, controls and other auxiliaries which can be combined with the stoker-boiler unit to form a complete package and can be factory-assembled and tested; (4) a control system reliable and simple enough to permit operating personnel to make repairs or adjustments; and (5) a coal-fired package unit with an initial cost comparable to that of competitive equipment.

Use of a water-cooled, vibrating-grate, crossfeed stoker seemed most likely to accomplish these objectives, BCR points out, since the front-to-rear flow pattern of the coal and ash facilities design of automatic ash-removal equipment; the operating principle of a vibrating grate provides a drive-mechanism simplification not possible with other types of coal burners; and the water-cooling feature of the grate would permit burning of coals having low ash-softening temperatures with minimum grate maintenance.



Components of the pilot model installed for test at BCR's Columbus laboratory, last September include a low-pressure Kewanee fire-box boiler with a rating of 1,490 lb of steam per hr, a BCR adaptation of an American Engineering Vibra-Grate stoker with 8½ sq ft of grate surface, and a twin-screw ash conveyor designed by BCR and adaptable to a wide variety of fire-box boilers now on the market, as well as several water-tube designs.

While not all the problems have been solved, satisfactory operations with extremes in coal-caking properties and ash-softening temperatures have been possible and completely automatic operation of the unit has been obtained during the tests, BCR reports. The boiler has been operated at from 200 to 2,400 lb of steam per hour with remarkably quick response.

Coal is conveyed by a screw conveyor from the bin to the stoker hopper where, by means of a bin-level control, a constant supply is maintained for the stoker. An automatic ash conveyor removes the ash from the pit at the end of the grate to two conventional ash cans. A timing device, set according to the percentage of ash in the coal, maintains a controlled level of ash in the pit.

At the turn of a switch, the plant is automatically shut down and a banked fire maintained for what appears to be an indefinite period of time, using from 1½ to 3 lb of coal per hr. Banked fires have been held for as long as 76 hr between runs. Steam has been reached in 25 min after starting from a bank with the boiler water temperature at 120 F and a demand of 1,200 lb per hr at 10 psi.

Complete tests with a variety of bituminous coals are now under way to determine the limitations of the automatic steam generator with regard to coal size consistency, caking characteristics and ash-softening temperatures.

House Bill Provides Aid to Coal Industry

A bill authorizing studies by the Secretary of the Interior to determine what the federal government can do to assist the coal industry to develop new markets and protect closed mines from deterioration has been introduced by Rep. Hyde (R., Md.) and referred to the House Interior Committee. The resolution directs the Secretary "(1) to make a study of the possibility of participation by the federal government, directly or indirectly, in research and investigation programs on the mining, preparation and utilization of coal and by-products of coal to the end that new uses and markets thereof may be developed, and (2) to make a study of what steps the federal government can take to prevent the deterioration of the physical plants of coal mines which are not in production because of the lack of markets for coal and coal by-products." An appropriation of \$150,000 would be provided for the studies and the Secretary would be required to report to the President and Congress not later than June 30, 1956.

What's NEW in Roof Bolting

PATTIN Has Designed a New
Self-Centering Bolt Head
and Protective Shell Tube.

THREE new improvements—each one helping to solve a packaging, shipping or installation problem—cut usual bolt handling and installation time up to 30%. Bolting crews can now be furnished with shipping bundles of 250 assembled bolts and shells containing 25 smaller bundles of 10 assemblies for easy handling—each shell covered with a protective tube, as shown above, to prevent damage to threads. It takes only a few seconds to remove the shell's protective tube and slip a plate washer (having a sufficiently large hole) over the shell and down the bolt to the new supporting bolt head that self-centers the plate washer on the head and it's then ready to be installed. Shipping—with bolt and shell assembled and with protective tubes covering the shells means—good bolt and shell thread fit—no lost parts—easier and quicker handling and installation—which means savings in time and dollars. No special nuts or ears are needed on the bolts.

For safer roofs—hard or soft—the PATTIN expansion shell having double the usual shell expansion plus a 3-inch contact with the hole wall provides the strongest known anchorage for roof bolts. They are easy to install as no definite drilling depth is required and the shell can be anchored any place in the hole without turning while being tightened.

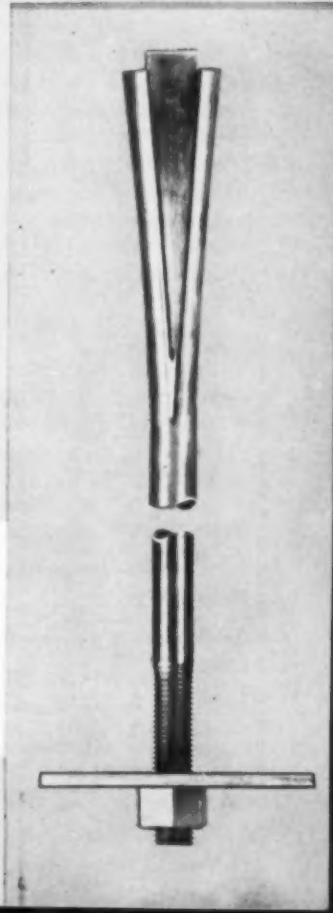
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PATTIN'S New
Self-Centering
Bolt Head



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ALL MINING COMPANIES now bolting, experimenting or planning to roof bolt can depend on PATTIN shells and bolts for better anchorage and reduced time in bolting cycles. Our engineers are available for consultation and demonstrations. Write or phone us—we'll gladly work with you on any present or future bolting program.



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a sling like this?**

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at lower cost**

—with *JalKlamp*



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AIME—The Chicago Meeting

Coal Division probes ways and means for improved mining and preparation, new uses through carbonization and gasification, and control of stream and air pollution.

REPORTS OF IMPROVEMENTS in flotation practice, new developments in carbonization, present and prospective problems arising from stream and air pollution and experience in underground mining with dry dust-collecting systems, planer mining and multiple-seam operations were major topics at technical sessions of the Coal Division, AIME, at the annual meeting at Chicago, February 14-17. Other features for Coal Division members were the presentation of the Erskine Ramsay Medal to George H. Deike Sr., chairman of the board, Mine Safety Appliance Co., Pittsburgh, for his service to the mining industry, particularly in the field of mine safety; presentation of the James Douglas Medal to Edwin L. Oliver, founder-chairman, Dorr-Oliver, Inc., Stamford, Conn.; and a talk on future plans for AIME by institute president Leo F. Reinartz at a Coal Division luncheon.

Theme of the Monday-morning session was froth flotation, with papers by Dr. S. C. Sun, associate professor, Pennsylvania State University; and B. W. Gandrud, chief, coal preparation and utilization branch, U. S. Bureau of Mines, Tuscaloosa, Ala. Co-chairmen were J. M. Vonfeld, production control man-

INDUSTRY MEETING— A Special COAL AGE Staff-Written Report

ager, Pittsburgh Coal Co., Library, Pa., and T. M. Jolley, preparation engineer, USBM, Pittsburgh.

IMPROVING FROTH FLOTATION

The removal of pyritic sulfur by froth flotation, particularly in coals otherwise suitable for metallurgical uses, is becoming increasingly important as reserves of low-sulfur are gradually depleted, Dr. Sun declared in reporting the results of flotation studies on high-sulfur coals. The studies lead to the conclusion that from operational and cost standpoints the practical flotation reagents are a combination of potassium or sodium cyanide, kerosene and pine oil or another frother. Furthermore, an appreciable reduction in sulfur can be made by tabling the minus 48-mesh coal, then grinding the concentrate and middlings to minus 100-mesh for flotation feed. Coal from the Lower Kittanning seam, for example, could be cleaned in this manner from an original sulfur content of 2.5% to a final of 1.5%.

On the other hand, the studies indicate that depressants are not effective where the sulfur in a particular coal is predominantly organic, Dr. Sun reported.

The major commercial difficulty with flotation and vacuum filtering is capacity, Mr. Gandrud pointed out, in telling of efforts to increase capacity in a 12-cu ft commercial-type cell, using the amount of float coal produced as a measure of capacity. The use of a set of 2 x 2 x 4-in baffle blocks in the bottom of the cell was effective in increasing capacity from 15% to 51% while reducing the amount of impeller power required. However, supercharging did not appear to have a beneficial effect.

Changing the solids content of the feed was effective, the amount of float coal being at a maximum when the feed contained from 15 to 20% solids.

"We may have had some mistaken notions about supercharging," Mr. Gandrud said, in pointing out that it is more a question of making good use of the air already in the feed pulp. This can best be done by perhaps redesigning cell bottoms to provide agitation.

Several flotation-plant operators, in discussion, agreed with Mr. Gandrud that flotation at 17-18% solids is more desirable.

Dr. Sun followed with another paper, this one on the effect of organic flocculants on coal sedimentation. Controlled tests of various flocculants on Pittsburgh-seam coal showed Aerofloc 552 of greatest effect and rice starch of least effect. In a chart-and-graph presentation, Dr. Sun showed the effects of viscosity, flocculant aging and interfering clays on sedimentation rates.

Continuing the major theme of preparation, speakers at the Monday afternoon session were L. L. Mohier, consultant, Fontainebleau, France, on the features of good installation in preparation plants; and J. Apotheker, sales engineer, The Eimco Corp., Pittsburgh, on the application of vacuum filters in coal-washing circuits. H. F. Hebley, Pittsburgh Consolidation Coal Co., and R. L. Llewellyn, Eastern Gas & Fuel Associates, presided.

EFFICIENT PREPARATION

In periods of slow demand, preparation installations are made with major emphasis on low cost operation regardless of the degree of realization of intrinsic efficiency of the washer. In periods of high demand for coal, however, it is necessary to be concerned with intrinsic efficiencies in order to achieve highest possible recovery, Mr. Mohier stated. Advocating a method of comparison based upon "Imperfection," Mr. Mohier pointed out that the space involved for the installation and automaticity also are factors to be considered in washer selection. The feldspar jig may have application in this country, Mr. Mohier concluded.

Clarification circuits for process water are becoming increasingly important,



GEORGE H. DEIKE SR. (left), chairman of the board, Mine Safety Appliances Co., receives Erskine Ramsay Medal from AIME president Leo F. Reinartz, vice president, Armco Steel Corp. Edwin Letts Oliver, founder-chairman, Dorr-Oliver, Inc., Stamford, Conn., was awarded the James Douglas Medal.

THREE NEW TIMKEN® BEARINGS COST LESS THAN PREVIOUS BEARINGS OF SAME BORE SIZES



New capacity-packed bearings take up less space, save weight

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TAPERED ROLLER BEARINGS

NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

Mr. Apotheker said, because of (1) the increased fines resulting from mechanized mining, (2) water scarcities in some localities which demand closed-circuit operation and (3) rigid clean-stream requirements in many states.

In an economic analysis of an actual \$100,000 installation of a continuous vacuum filter and related equipment, Mr. Apotheker reported costs per ton of bone dry solids as follows:

| | |
|---------------|-------|
| Labor | 11.4c |
| Power | 6.8c |
| Maintenance | 3.4c |
| Amortization | 11.4c |
| Miscellaneous | 2.4c |
| Total | 35.4c |

This filter cake is good metallurgical coal, formerly not recovered and now selling at a respectable price. Therefore, this clarification circuit has proven to be a sound investment, Mr. Apotheker declared, in pointing out that a profitable return as well as more efficient operation have been achieved.

It was brought out in the discussion that the percentage of minus 200-mesh fines in the filter feed is very important, since the moisture of the cake varies directly with the amount of 200-mesh. Co-chairman Llewellyn suggested that operators make available to teams like Mr. Apotheker and his co-author, D. A. Dahlstrom, director of research, The Eimco Corp., such data as may be available for further expansion of clarification studies.

Second-day sessions were devoted to discussions of coal carbonization and the control of stream and air pollution. Speakers at the morning session on carbonization were V. F. Parry, chief, Coal Branch—Fuels Tech. Div., USBM, Denver, Colo., on low-temperature carbonization of lignite in the entrained state; C. G. von Fredersdorff, research engineer, Institute of Gas Technology, Chicago, on pressure gasification of pulverized coal for pipeline-gas production, and C. E. Lesher, consulting engineer, Pittsburgh, on agglomeration of fine-sized ores with low-temperature coke. Co-chairmen were H. H. Lowry, consulting engineer, Wilmerring, Pa., and C. C. Russell, manager—coal carbonization research, Koppers Co., Pittsburgh.

CARBONIZATION, GASIFICATION

Mr. Parry reviewed the development work on pilot and commercial plants for drying and carbonizing non-coking coal, with particular emphasis on the plant at Rockdale, Tex., where lignite is dried and carbonized to provide char for boiler fuel and produce tar and gas.

In reviewing the general technology of carbonizing coal in the entrained state, Mr. Parry demonstrated that the yield of primary tar is proportional to the heat in the volatile matter of the coal and that the yield of tar from non-coking coals may vary from 10 to 45 gal per ton on an ash- and moisture-free basis. Pilot plant operations have shown that 100 to 135% of the bench-scale carbonization assay yield of tar may be obtained, the additional yield perhaps being the result of the rapid rate of carbonization in the entrained state which results

in less decomposition of primary tar.

The pilot plant at Denver processes Texas lignite at from 300 to 600 lb per hr, and the commercial plant at Rockdale, serving a plant of the Aluminum Co. of America, produces char, tar and gas similar in quality and yield to those obtained from the pilot plant, although on a greatly expanded scale.

Interest in the production of high-Btu pipeline gas from coal has been stimulated, Dr. von Fredersdorff said, by the increasing cost of natural gas and eventual need for large quantities of substitutes. Studies at the Institute of Gas Technology have been directed toward the production of synthesis gas from pulverized coal and the catalytic methanation of the synthesis gas. On a pilot-plant basis, the continuous gasification of coking and non-coking pulverized coal in suspension with oxygen and steam at super-atmospheric pressures has been successfully demonstrated at high temperatures, 2,300-3,000 deg F, and ash-sludging conditions.

Equipped with a continuous coal-conditioning system, including an explosion pulverizer-cyclonizer, the gasifier has processed up to 100 lb per hr per cu ft of reactor volume, which is high capacity when compared with standard gasification processes. Considered to be independent of the physical and chemical properties of the coal, the suspension gasification process converted up to 95% of the carbon in the coal to gas, Dr. von Fredersdorff pointed out.

Reduction of finely-divided oxide ores has long been a major metallurgical problem, Mr. Lesher pointed out in leading into a description of processes for producing Orcarb, which is a combination of fine ore covered with enough coke carbon to effect reduction of the ore particle. In another process, ore-carbon pellets are produced. In pilot plant research, carried on over the past 3 yr, agglomerates of such ores and reduction carbon have been produced for use in fluid-bed reactors, open-arc electric furnaces and other metallurgical operations where process heat is from an extraneous source.

The pellets are made within size limits from fine ores and carbon binder for use in fixed-bed reactors and buried-are electric furnaces.

Lead-off paper at the Tuesday afternoon session was presented by C. E. Silverblatt, development engineer, The Eimco Corp., Palatine, Ill., on the applications and economics of slime removal for closed water circuits. The pollution-control theme was continued with presentations on sealing mine refuse piles with refuse fines, by G. P. Mazie, mining engineer, USBM, Pittsburgh; and on truth and fallacy regarding acid coal-mine drainage, by S. A. Braley, research fellow, Mellon Institute of Industrial Research, Pittsburgh. H. F. Hebley and H. A. Herder, Sahara Coal Co., Chicago, presided.

CLEAN STREAMS AND AIR

Three methods presently available for slime removal are (1) lagooning without flocculation, (2) flocculation, thickening

and lagooning and (3) flocculation, thickening and filtration, Mr. Silverblatt pointed out in leading into a discussion of the relative merits of each. Simple lagooning of course is most economical, if pond area is available and real estate is cheap. However, even the cost of this method of slime disposal may become unreasonable if expensive dikes must be built and maintained or if the pond must be cleaned out at intervals. Also sludge ponds require most make-up water facilities at the plant and perhaps extensive pumping.

Where sludge-pond area is limited, Mr. Silverblatt explained that it might be advantageous to flocculate and thicken the solids, returning the clarified water directly to the plant and disposing only the thickened solids in the sludge area.

The other possibility, which is flocculation, thickening and filtration, permits total elimination of the sludge lagoon and its attendant problems.

In the matter of costs, Mr. Silverblatt estimated that total cost (exclusive of building) per ton of dry slimes removed would be about 43c per ton in systems where 10 tph are removed, 29.6c per ton in 25-tph systems and 26.8c per ton in 40-tph systems.

In test work conducted to date it has been shown that a filter may produce bone-dry cake at rates as high as 46 lb per hr per sq ft of filter surface. Filtrate clarity varies from sparkling to 100 ppm and cake moisture is about 36%.

Bituminous refuse in 1949 in Alleghany County, Pa., amounted to 31,000,000 tons, Mr. Mazie stated, in pointing out the need for erecting refuse piles in a manner that will prevent spontaneous ignitions. In field work involving some 100 gob piles within a 60-mi radius of Pittsburgh, bureau engineers have concluded that piles can best be sealed by covering or interbedding with layers of $\frac{1}{4} \times 0$ refuse fines. In some instances, active gob-pile fires have been extinguished by sealing with such fines. Where mine refuse does show spontaneous-ignition tendencies, it may be advantageous to separate refuse to recover the finer material to be used as sealing material.

Other factors to be considered in designing refuse-disposal methods and selecting the sites include trying to expose the least flank area per unit of volume in the pile, and keeping seals in good repair once they have been applied.

"Acid drainage is the most serious of all stream pollution problems," Dr. Braley declared, in pointing out that there is no ready solution. Most suggested solutions are based upon lack of information. For example, mine water can be limed, but the volume is staggering, 1,000,000 tons of sulfuric acid per yr in southwestern Pennsylvania is one estimate. Since neutralization is a pound for pound proposition, this approach to a solution is too costly, and anyhow the flow fluctuates widely, Dr. Braley continued. Furthermore, pH is not an airtight measure of acidity, being more qualitative than quantitative.

The coal industry has a vital stake in clean streams, Dr. Braley pointed out because the industries which consume the coal also must have suitable water for use in boilers and processes.

Mine sealing does not appear to be as effective as might be hoped because the seals are designed to exclude air from the workings but they can't hope to do that. Inhibitors to acid formation might be beneficial, but the big problem is introducing the inhibitor into the mine.

No blanket statements can be made with regard to answers to the acid-drainage problem, perhaps the best advice being to keep water out of the mine or get it out as quickly as possible if it does get in, Dr. Braley concluded.

In discussion, Mr. Hebley brought out that a Senate Bill presages possible Federal regulation of interstate waters with regard to pollution, and that the State of Ohio is engaged in a study to determine if coal operators along a certain waterway should not be taxed to provide stream-cleaning funds.

Deep-mining considerations took center stage for the Wednesday meetings. Speakers were David T. Stemple, assistant chief engineer, New River & Pocahontas Consolidated Coal Co., Berwind, W. Va., on problems encountered in multiple-seam coal mining; and W. A. White, associate geologist, Illinois Geological Survey, Urbana, Ill., on underclay squeezes in coal mines. Co-chairmen were D. C. Abernethy, USGS, and S. H. Ash, USBM, Washington, D. C.

GROUND FORCES IN DEEP MINING

Multiple-seam mining at 61 operations were studied, Mr. Stemple reported, in his review of factors to be considered in approaching such work. The selection of which seam in a group of seams should be mined first may depend upon economic factors primarily. If the lower seam is to be mined first, the proper width of opening may be determined by relating local conditions to the pressure-arch theory, which appears to hold reasonably true in actual instances. The time lapse then between recovery in the lower seam and the start of operations in an upper seam should be sufficient to permit the mining voids to be filled. In this regard, it appears that shale over the coal and then sandstone roof are most effective in filling voids.

In simultaneous mining of contiguous seams it should be remembered that top seam recovery may be complicated by subsidence and bottom seam recovery by pressure. Columnization of pillars is advocated but cannot always be guaranteed, and it is further recommended, Mr. Stemple said, that pillar lines in contiguous seams be kept parallel, with the upper line even with or somewhat ahead of the lower, perhaps 100 ft.

In formal discussion, F. R. Zachar, general superintendent, Christopher Coal Co., Div. of Pittsburgh Consolidation Coal Co., Purglode, W. Va., pointed out that in the future the demands of conservation may rule in selecting the order of mining in multiple seams. Mr. Zachar also told of some of the difficulties

of mining in the Pittsburgh seam after the overlying Sewickley seam had been partially mined. Sewickley pillars transmitted excessive pressure onto the Pittsburgh-seam workings, resulting in squeezes that forced the abandonment of some valuable coal.

W. J. Skewes, chief engineer, Pocahontas Fuel Co., Pocahontas, W. Va., held that marketability still governs in selection of the order of mining in explaining that perhaps the best methods include complete extraction in the lower seam, followed by time for complete settlement before opening the upper seam. Columnization is beneficial, Mr. Skewes said, but satisfactory costs and recovery are sometimes difficult to maintain.

In a preliminary report on studies of underclay squeezes, W. Arthur White, associate geologist, Illinois Geological Survey, Urbana, Ill., reported that samples of underclay from squeeze areas generally contained the clay mineral montmorillonite, which has the plastic characteristics of ice. Samples taken from squeeze and non-squeeze areas indicate that natural moisture content does not vary greatly between the two, thus throwing suspicion on the thin-crystal montmorillonite. The mineral may be detected by staining techniques, Mr. White said, in explaining that it may be possible to predict from core-drilling samples whether an underclay may squeeze in future mining.

Underground mining also was the theme of the Wednesday afternoon session, when a paper on the effect of natural conditions on coal-planer performance was read by Stephen Krickovic, chief engineer, Coal Div., Eastern Gas & Fuel Associates, Pittsburgh, and a paper on dry dust-collecting with rotary drilling was presented by C. William Parisi, director of safety, Pittsburgh Coal Co., Library, Pa. Session chairmen were C. B. Tillson, general superintendent, Crucible mine, Crucible Steel Co. of America, Crucible, Pa., and George J. Clark, vice president-operations, Philadelphia & Reading Coal & Iron Co., Pottsville, Pa.

The pressure-arch theory appears to be a logical explanation of roof action in two planer-mining panels in the Pocahontas No. 4 seam at Stotesbury No. 8 mine, Mr. Krickovic explained in citing possible causes for the phenomena observed in the course of the work. In spite of many complications, however, productivity in the second panel was 30% higher than in the first and 60% higher than in conventional methods employed in other sections, Mr. Krickovic reported, in his review of practices which were earlier presented at the December, 1954, meeting of the Coal Mining Institute of America. A more complete abstract appears in *Coal Age*, January, 1955, p 125.

In discussion, John S. Todhunter, production engineer, Barnes & Tucker Co., Barnesboro, Pa., advocated longwalling as a productive system of continuous mining, based upon his company's experience with a Samson Stripper in Central Pennsylvania. It is essential, however, that an operator study his local condi-

tions thoroughly before undertaking longwall mining, Mr. Todhunter said. For example, bottom may appear to be soft but may not heave, the coal may be friable in some methods of working and behave differently in longwalling. Other speakers, including Louis Turnbull, USBM, Pittsburgh; W. G. Wayland, USGS, Washington, and A. M. Keenan, Thompson Creek Coal & Coke Co., Glenwood Springs, Colo., concurred in advocating continued study and application of longwall methods.

DRY DUST COLLECTION

On the subject of dry dust-collection, Mr. Parisi pointed out that rapid acceptance of roof-bolting resulted in an apparent lag in solving the dust problem. In 1950, however, the Bureau began tests at Bruceton and soon thereafter a schedule had been prepared against which new dust collectors could be rated. In August, 1952, the first approval was issued.

The bolting unit in use at mines of the Pittsburgh Coal Co. includes a combined Fletcher drill and MSA dust collector. The approval covers the integrated unit. The cuttings are drawn into a yoke at the collar of the hole by a vacuum which draws 72 cfm through the collector hose. The air then is passed through primary and secondary collectors for precipitation of the solids. The secondary collector is equipped with a filter bag which has shown a life of up to 360 shifts, Mr. Parisi said. The solids are trapped in collecting drums on the machine, and these may be instantly unloaded by operating simple dump levers.

The equipment has been greatly improved, Mr. Parisi said, but it is necessary to have trained drillers and to maintain the complete unit, drill and dust collector, in good working order.

Although dry dust collectors were not immediately accepted by drillers and supervisors, now most men who have used them will not work without them, was the report of Richard Johnson, district manager, Mine Safety Appliances Co., Uniontown, Pa., in pointing out that more than 200 collectors have been sold and are in use. The result has been elimination of wet dust and special clothing for drill crews, and the acceptance of the drill-and-collector as an efficient mining unit.

J. E. Elkin, general superintendent, Coal Dept., Duquesne Light Co., Pittsburgh, told of the early development of a canister-type collector, without hose or power connections, which was recently submitted to the Bureau for testing.

On new development, C. W. Owings, chief, dust section, USBM, Pittsburgh, said that a new schedule is under preparation to include the newer fast-penetration drills, and J. H. Fletcher, J. H. Fletcher & Co., reported his company's development of a lift jack designed to raise the collector yoke against the roof and center the bit as the foot jack of the drill drops into place. Mr. Fletcher also advised the use of augers having a scroll pitch the same as the hole diameter for more efficient removal of cuttings, thus faster drilling.

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News Briefs and Trends

1955 Output 5.9% Ahead

Bituminous production from Jan. 1 to Feb. 12, 1955, totaled 51,981,000 tons, a 5.9% gain over the same period of 1954, according to USBM figures. Output for the week ending Feb. 12 was 8,690,000 tons, 30,000 tons off from the previous week but more than 1,000,000 tons over the tonnage in the same week of 1954. For the first time during 1955 anthracite tonnage during the week ending Feb. 12 topped that of the corresponding week in 1954. Output that week totaled 654,000 tons, compared with 609,000 tons for the week ending Feb. 5 and 590,000 tons for the corresponding week of 1954. Anthracite production through Feb. 12, 1955, totaled 3,509,000 tons, a decrease of 10.5% from the same period in 1954.

Gas Storage Regulation Sought in West Virginia

A bill designed to provide greater safety for coal mines operating in the vicinity of natural-gas storage pools was introduced into the West Virginia House Feb. 17 by Dels. Watson and Fumics. The proposal, which reportedly has the support of storage-pool operators, coal operators, UMWA and the state Mines Department, would make no change in the present drilling and plugging laws. It provides for the regulation and supervision under the state Mines Department for the operation of underground gas-storage reservoirs beneath or within 2,000 ft of an operating coal mine other than an auger or strip operation. Operators proposing to open a storage pool would be required to work out testing procedures with the coal operators affected, with disagreements submitted to the state mines chief and, if necessary, to the proper courts. Provisions for filing of maps and other data by both gas and coal operators also are included.

P&R Cuts Deep Mining by 86%

The Philadelphia & Reading Coal & Iron Co. has closed down all its deep-mine operations except its Pine Knot mine, which was responsible for about 14% of its 1954 deep-mine output, Edward G. Fox, P&R president, reported in a letter to stockholders last month. According to its plan announced earlier, the company has suspended operations at the Locust Summit central breaker but will continue to produce coal at the St. Nicholas and Oak Hill breakers. The plan provides for production of about 3,000,000 tons of company coal and 1,250,000 tons produced by associates, both of which will be coals of high standards and quality, he said. The detailed analysis of 1954 operations indicates that deep-mine operations produced a loss of \$2,774,000, equal to practically the entire deficit for the year before provision for disposition of property. The company's loss of \$7,324,031 for 1954 includes actual charge-offs of \$428,000 for deep mines abandoned during the year and an additional provision of \$4,862,000 to cover remaining losses from past abandonment and

anticipated losses from abandonment of additional deep mines and surface facilities.

Congressional Study of Air Pollution Sought

The establishment of a special committee of the House of Representatives "to conduct a full and complete investigation and study of air pollution in the United States" is called for by a resolution introduced by Rep. Dollinger (D., N. Y.) and referred to the Committee on Rules. "Air pollution has been proved to be a menace to the health and welfare of the people," the resolution stated, and "its effects frequently transcend state lines and create a serious interstate problem." Under the resolution, the Speaker would appoint seven members of the House to the committee and it would report its findings and recommendations "as soon as practicable during the present Congress."

New Pennsylvania Operation

The Cloverleaf Machine & Service Co., Clearfield, Pa., is reportedly planning to begin coal mining this spring on a 25,000-acre tract in the vicinity of DuBois, Pa. The coal, estimated to hold reserves for 35 yr of mining, is located under land recently sold to the state for a wild game preserve, mineral rights for which were retained by the coal company. The firm expects to employ about 100 men initially and will probably increase its working force to nearly 200 later, according to Robert D. Smith, company president.

German Coal Planer Installation Completed by Amherst Coal Co.

The Amherst Coal Co., Lundale, W. Va., announced last month that it had just completed installation of a coal planer imported from Germany at its No. 4 Mine, Accoville, W. Va. The coal planer now is being operated one shift per day, but plans are being made to expand to a two-shift basis as soon as sufficient men are trained for two-shift operation. The planer operates on a 450-ft longwall face and is powered by three 50-hp AC motors. The coal is dis-

Continued on p 136

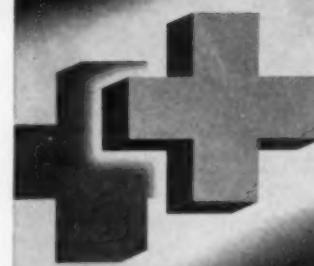
Preparation Facilities

U. S. Steel Corp., Lynch plant, Corbin, Ky.—Shipment by Deister Concentrator Co. of 18 SuperDuty Diagonal-Deck No. 7 coal-washing tables, two Model 108-B and one Model 108-B-2 Concenco revolving feed distributors.

Minersville Coal Co., Inc., Minersville, Pa.—Shipment by Deister Concentrator Co. of one coal-washing table for cleaning Nos. 4 and 5 buck anthracite.

Avon Coal Co., Ltd., Minto, New Brunswick, Canada—Shipment by Deister Concentrator of one Leahy HeavyDuty "No Blind" vibrating screen, FlexElex

answer the call



join and serve

heating, for screening fine damp coal.

Gibraltar Coal Corp., Central City, Ky.—Contract closed with McNally Pittsburg Mfg. Corp. for complete 900-tph coal preparation plant, including McNally Pittsburg heavy-duty rotary breaker to reduce R-O-M to 4 x 0 which is then delivered to two 5,000-ton stockpiles for Nos. 11 and 12 seams; two seams blended by belt feeders and delivered to washery; portion of 1/4 x 0 removed raw prior to washing in two McNally Norton automatic Baum jigs equipped with middlings crusher and recirculation for recovery of middlings values; 4 x 0 dewatered at 3% and 4 x 1/2 crushed to minus 1 1/4 and reassembled with 1/4 x 0 prescreened raw coal; 1/4 x 0 from primary dewatering screens recovered in drag-type settling tanks and dewatered centrifugally for reassembly with washed coal; complete end products delivered to 5,000-ton washed-coal storage pile, from which washed coal is recovered, automatically sampled and weighed for final delivery to barge-loading equipment with capacity of 850 tph; 4 x 0 washery refuse disposed of by hydraulic method.

Guyan Eagle Coal Co., Proctor No. 1 mine, Amherstdale, W. Va.—Contract closed with McNally Pittsburg Mfg. Corp. for washing and centrifugal drying addition to existing plant consisting of McNally Norton automatic washing equipment to clean 317 tph of 1 1/4 x 0 raw coal; existing cleaning equipment altered to permit crushing and rewashing of middlings with additional dewatering, classification and blending equipment.

Mid-Continent Coal Corp., Green Diamond mine, Marissa, Ill.—Contract closed with McNally Pittsburg Mfg. Corp. for middlings-rewash addition incorporating new McNally Norton automatic rewasher to receive 4 x 0 crushed middlings from existing McNally Norton washer; plant includes additional water-handling facilities.

Lithgow Valley Colliery Co., Ltd., Hermitage colliery, Lithgow, New South Wales, Australia—Contract closed with Jeffrey Mfg. Co. for one 7-ft two-compartment five-cell jig, handling 6 x 0 raw coal; 1 1/4 x 0 sizes shipped; capacity, 125 tph of jig feed.

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We invite you to investigate our "OCC" Heavy-Media vessel, newly introduced by Wilmot. Its noteworthy advantages include: (1) the entire separating process is performed with only the mechanism and power required for lifting the sink from the pool; (2) it permits continuous visual inspection; (3) there are few moving parts, resulting in minimum 'down' time; (4) it is installed in little floor space. We furnish single replacement units or complete HMS systems.

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ACCIDENT-FREE CREWS FOR 6 YR—Foremen W. M. Harlow (left), Curt Matney, H. B. Artis and Ira Bradford receive from Frank B. King, chief of the W. Va. Dept. of Mines & Minerals, Red Jacket awards for supervising sections 6 yr without a lost-time accident among crew members. In right photo, W. R. Parks, district supervisor, USBM Mt. Hope office, presents awards for 5-yr records to John Halley (left) and Herbert Williamson.



FOUR-YEAR MEN—J. M. Hutchinson (left), J. H. Damron, Glenn Snead, W. D. Dye and F. C. Daniels receive awards for 4 yr of supervision without a lost-time accident. J. M. Benson, director of safety, Southern Coal Producers' Association, officiates at the microphone.



BEST SAFETY RECORD—Keen Mountain mine officials receiving the trophy from William M. Ritter, Red Jacket president, include J. A. Damron (left), superintendent; Douglas Halstead, assistant superintendent; Darrel Gillispie, general mine foreman; and Joe Gillispie.

Dinner Stars 75 Red Jacket Foremen

SEVENTY-FIVE FOREMEN of the Red Jacket Coal Corp., Red Jacket, W. Va., were honored for outstanding safety records at a dinner given by the company Jan. 22 at the Mountaineer Hotel, Williamson, W. Va. Operating seven mines in West Virginia and one in Virginia, Red Jacket produced close to 3,500,000 tons in 1954 with lost-time accidents 73% below 1943 and tonnage per lost-time accident 210% greater.

The trophy for the company mine with the best 1954 safety record was presented by William M. Ritter, president, to the Keen Mountain (Va.) mine, J. A. Damron, superintendent. Keen Mountain produced 34,191 tons per lost-time accident in 1954, reduced its frequency rate to 29.94 and severity rate to 1.57, and had mined nearly 2,500,000 tons since the last fatality.

R. A. Ison, assistant to the president, served as toastmaster for the dinner and highlight of the program was the presentation of awards to foremen who had not had a lost-time accident among their crew members for periods ranging from 1 to 7 yr. Speakers presenting these awards were: G. F. Davis, Red Jacket general superintendent; J. L. Gilley, chief USBM Norton (Va.) office; J. T. Whalen, supervising inspector, USBM, Logan; W. H. Tomlinson, training and administrative officer, USBM, Pittsburgh; J. B. Benson, director of safety, Southern Coal Producers' Association; W. R. Park, district supervisor, USBM, Mt. Hope; Frank B. King, chief, W. Va. Dept. of Mines & Minerals; and Harry Gandy Jr., director of safety, National Coal Association.

Other dinner speakers included C. H.

Williams, Red Jacket chief engineer; J. J. Plasky, training and safety director; and William M. Ritter, president.

Following is a list of the 75 foremen honored, arranged by period of supervision without a lost-time accident among crew members. "Honorable Mention" went to men who cleared their records after accidents by which they barely missed an award.

Seven Years—T. E. Sizemore, Wyoming mine.

Six Years—W. M. Harlow, Curt Matney, Keen Mountain; H. B. Artis, No. 17 mine; and Ira Bradford, Wyoming.

Five Years—John Halley, Junior; and Herbert Williamson, Mitchell Branch.

Four Years—J. M. Hutchinson, J. H. Damron, Glenn Snead, W. D. Dye, Keen

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BIG BITES of overburden like this go into the shovel every time with the TD-9 Skid-Shovel applying 11,500-pound break-out force—300% greater than equal-sized loaders—to scoop up shot rock, hardpan, and even small trees in the stripping operation.



41° BUCKET ROLL-BACK at ground level, an exclusive feature, keeps heaped loads like this in the 1½-yard bucket every pass. And the exclusive Skid-Shoes transfers loading and carrying strain into the ground, away from the crawler.



FASTER TRANSPORT of heaped loads is assured with a TD-9 Skid-Shovel since the overburden is semi-skidded at ground level in high gear—not in first. Exclusive Hydro-Spring takes 70% of shock loads out of bucket drop during loading.



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Mountain, and F. C. Daniels, No. 17 mine.

Three Years—Tom Hammond, Fred Sears, Stuart Chafin Jr., Mitchell Branch; Bernard Farmer, Charles Owens, Clyde Looney, Keen Mountain; Roy Cook, Wyoming; Ernest Stallard, Red Jacket Outside; Russell Burleson, No. 17; and Bill Dehart, Junior mine.

Two Years—Dominick Clusky, Amos Williamson, Douglas Jones, William Calloway, Hershel Potter, Elmo White, No. 17 mine; Charlie Smith, Arlie Clay, Mitchell Branch; Don Hatfield, Ted Morgan, Coal Mountain No. 12; H. H. Jones, Harry Danielson, Roger Hooker, Keen Mountain; Tom Blankenship, E. O. Smith, Oley Stewart, Wyoming; Kenneth Rowe, A. L. Preston, Clyde Hammond, W. R. Hoskins, Lawrence Hatfield, Junior mine; and Louis Vagott, Red Jacket Outside.

One Year—Henry D. Shell, Frank Stout, Lacy Breeding, Cecil Null, Clarence Elswick, Garland Brown, S. H. Rose, Joe Henderson, Keen Mountain; Green Tiller, Dayton Johnson, George Williamson Jr., Russell Williamson, Gordon Smith, Don Hinkle, W. C. Hammond, Cyrus Hatfield, E. S. Burleson, Junior mine; Okey Bailey, Elmer Blizzard, Coal Mountain No. 12; Humphrey Ellis Jr., Jay Walls, Coal Mountain Outside; Howard Radford, James Hammond, Mitchell Branch; A. J. Wallace, Golden Barrett, Bernard Milam, Ira Goble, Tom Ramey, No. 17 mine; Frank Mosolgo, Wyoming; and Posey Elkins, Red Jacket Outside.

Honorable Mention—Bill Gillispie, W. O. Bohom, Evan Edwards, Keen Mountain; Don Shields, Coal Mountain; Willis Whitt, No. 17; and Jim Backus, Junior.

Among the Manufacturers

New Head for McNally Pittsburgh

Edward T. McNally has been elected president of the McNally Pittsburgh Mfg. Corp., Pittsburgh, Kan., to succeed his father, Thomas McNally, who resigned recently to become chairman of the board of directors. Thomas McNally, founder of the firm, has been its president since its inception in 1912. Edward T. McNally, formerly vice president and treasurer, has been active in the company's management since completion of his education at the University of Notre Dame and the University of London in 1937. Additional changes among McNally Pittsburgh executives include the advancements of Robert L. Pate, formerly chief engineer, and Chas. H. J. Patterson, formerly director in charge of engineering, to vice presidents. Homer

W. Riley and W. S. McAleer were re-elected as vice presidents, and Thos. F. Stevenson was re-elected secretary.

Western Office for Jeffrey

The Jeffrey Mfg. Co., Columbus, Ohio, has opened a western territory sales headquarters, according to an announcement by Lincoln Kilbourne, general sales manager, Conveyor Div. Stanley M. Mercier, for the past 15 yr chief engineer of this division in Columbus, has been appointed manager, with offices in the Flood Bldg., 870 Market St., San Francisco. Mr. Mercier joined the Jeffrey organization in 1926 as a design engineer and then took charge of New England district sales before assuming his duties as chief engineer. The newly established headquarters will direct

Jeffrey sales activities in the 11 western states, continuing the present means of distribution and selling through this territory.

Holden Heads Macwhyte Sales

Francis D. Holden has been appointed manager of sales for the Macwhyte Co., Kenosha, Wis., according to an announcement by R. P. Tyler, vice president in charge of sales. Mr. Holden, who has been assistant general sales manager since 1948, first was employed by Macwhyte during school vacations while he attended Lawrence College. After graduation in 1934 he joined the Macwhyte general sales department.

Hough Officials Advanced

The Frank G. Hough Co., Libertyville, Ill., has announced the promotion of G. A. Gilbertson and R. L. Beyerstedt to executive vice presidents. Mr. Gilbertson, formerly vice president in charge of sales, advertising and service, now is executive vice president and general manager. In his new capacity, he will assume responsibility in assisting Mr. Hough with over-all management and policy matters. Mr. Beyerstedt, formerly vice president and chief engineer, now is executive vice president in charge of engineering and product development, with additional responsibilities with respect to the company's accelerated product development program. In announcing the changes, Frank G. Hough pointed out that he has no intention of retiring and will continue to be active as president.

Stonerod Heads Brooks Sales

The Brooks Oil Co. has appointed T. M. Stonerod general sales manager, with headquarters in Pittsburgh. Previously he had been assistant to the vice president of sales and engineering, in which post he served as head of Brooks' Mining Sales Div. Mr. Stonerod joined



COAL MEN ON THE JOB . . .

GUYAN EAGLE COAL CO.: Fred Gilmore (left), chief electrician, Guyan No. 5 mine, Kelly, W. Va.; and Ted Barrs, night chief electrician, and Harry Smith, Chief electrician, Guyan No. 1 mine Amherstdale, W. Va.



CONSOLIDATION COAL CO. (KY.), Mine No. 214, McRoberts, Ky.: A. T. Scott (left), wireman; C. M. Fields, assistant maintenance foreman; and Joe Varson, maintenance foreman.

the company in 1940 as a sales engineer. In 1946 he became sales manager of the company's Pittsburgh district, a position he held until he was named assistant to the vice president in 1953. The company also has announced the appointment of Alfred A. Paul as manager of services, with headquarters in Pittsburgh. With the firm since 1940, Mr. Paul has been in charge of Brooks' Chicago sales district and warehouse for the past 10 yr.

FSL to Handle Rema Line

Milton B. Beach, president of Flexible Steel Lacing Co., Chicago, accompanied by Mrs. Beach, recently sailed to Europe aboard the liner United States to conclude arrangements for Flexible Steel Lacing to act as agents for the sale of "Rema" in the United States. Rema is a self-vulcanizing rubber repair material for repairing rubber conveyor belts and rubber-covered electrical cables (*Coal Age*, August, 1954, p 104). It requires no heat and repaired belts or coverings can be returned to operation immediately.

Reliance Acquires Reeves

Reliance Electric & Engineering Co., Cleveland, has negotiated for the acquisition of the Reeves Pulley Co., Columbus, Ind., it has been announced by J. W. Corey, company president. Under the arrangement, which is subject to stockholder approval, the two companies will merge operations in exchange for Reliance common stock and cash, the Reeves shareholders thereby becoming partners and substantial stockholders in Reliance. Starting 50 yr ago as an electric motor manufacturer in Cleveland, Reliance today also has plants in Euclid and Ashtabula, Ohio, and a subsidiary company in Canada, and is a major producer of electric motors and electronically controlled drive system. Reeves is a leading manufacturer of infinitely variable speed transmissions and mechanical vari-speed drives. "These two companies operating as a unit," Mr. Corey said, "will offer a broad line of variable speed drives to serve industry." By the merging of interests and the consolidation of efforts the sales and service outlets of both companies are expected to increase the total sales of the joint organization, which in 1954 amounted to more than \$43 million. Combined assets of the companies will exceed \$25 million. The management at Reeves will remain intact and it will continue as a separate division.

New Mack Trucks President

P. O. Peterson has been elected president and chief executive of Mack Trucks, Inc., New York. E. D. Bransome, formerly president and chairman of the board, continues as chairman. Before joining Mack, Mr. Peterson was executive vice president of Studebaker-Packard Corp., S. Bend, Ind. He has spent his entire career in the automotive industry, starting in the Studebaker purchasing department in 1919. The election of Mr. Peterson "is directly related to an aggressive program now under way whereby Mack will expand and strengthen its position as a major factor in all phases of

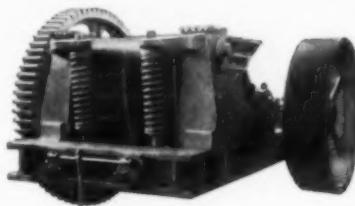
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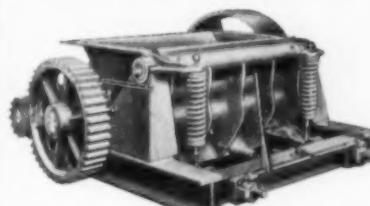
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Single Roll Rockmaster Crusher for both primary and secondary crushing of rock and mine refuse. Bulletin RM-503.

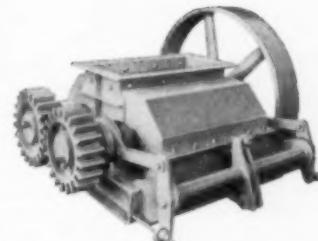


Single Roll Black Diamond Crusher with exclusive automatic steelstrut toggle and quick adjustment. Bulletin BD-457.

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The low cost Mc Lanahan Bantam Buster Single Roll Crusher. Bulletin BB-5112.



Mc Lanahan Black Diamond Double Roll Crusher for various reductions of medium-size feeds. Bulletin BDDR-255 (for coal) and DR-155 (for rock).

Backed by 120 years of manufacturing experience, Mc Lanahan builds crushing equipment for the ultimate in economy through long service and minimum maintenance costs. This equipment, which has been thoroughly service-proven on the most demanding of domestic and foreign installations, is available in a variety of sizes for every coal crushing requirement. Mc Lanahan is equipped to produce complete units, from feeders, primary and reduction crushers through elevators, sizing screens, etc.

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250 Wall Street, Hollidaysburg, Pennsylvania

NEWS BRIEFS . . . From p. 130

lodged from the face by the planing action of a "plow" which is pulled along the face by heavy chains. Roof support along the face is maintained by 625 steel jacks having a capacity of 130 tons each. The company feels that the planer will result in safer, lower cost, and better quality coal production. It is now operating in a 40-in seam of high-grade metallurgical coal. Much of the production of this mine goes to Europe for steel-making purposes.

Washing Plant Suit Settled

F. H. McGraw & Co., engineers and constructors, New York, announced Jan. 27 that its differences with Jones & Laughlin Steel Corp. with respect to the design and construction of a coal washing plant completed for J&L in East Fredricktown, Pa., in 1949, have been settled. No details of the differences nor the basis for settlement were given, except to confirm that this was a matter which had been pending in litigation by suit and counter-suit, each of which involved more than \$3,000,000. Depositions before trial had been completed by each party and the trial had been set down for the February term in U. S. District Court, Pittsburgh.

Page Company Buys Nassau Coal

The Page Coal & Coke Co., Pageton, W. Va., has purchased all the stock of the Nassau Coal Co. from the Peerless Coal & Coke Co., it was announced Feb. 1 by Warren F. Leatherman, Page president. The firm will take over the Nassau operations at Black Wolf. Everett L. Poe, general manager of operations for Page, will be in charge of the Nassau mine, with Walter E. Bailey continuing as mine superintendent. Opened in 1948, the mine employs some 175 men and produces approximately 1,400 tpd. Sale of the Nassau mine will be of advantage to both companies, according to Roland C. Luther, executive vice president of Peerless Coal & Coke Co. Page acquires an operation close to its present mine at Pageton, and Peerless will be free to concentrate and expand its operations at Vivian, where it recently acquired substantial reserves in the Carswell and Maitland properties formerly operated by EG&FA. The Nassau coal will continue to be sold by Peerless Coals, Inc., Cleveland.

W. Va. House to Consider New Safety Measures

Five bills designed to tighten the state's mine safety regulations were introduced into the West Virginia House Feb. 4 by Chairman Lilly of the House Mining Committee. One of the measures would require installation and maintenance of bleeder ventilation systems in unused or abandoned sections of coal mines, with such systems subject to the approval of the district mine inspector and the chief of state mines department. Another bill would bring auger mining within the strip mining law and would place supervision of the rehabilitation

MEETINGS

American Power Conference: 17th Annual Conference, March 30-April 1, Sherman Hotel, Chicago.

Bituminous Coal Research, Inc.: Annual Meeting, April 13, William Penn Hotel, Pittsburgh, Pa.

American Mining Congress: Coal Convention and Exposition, May 16-19, Cleveland, Ohio.

Rocky Mountain Coal Mining Institute: 51st Annual Meeting, June 26-29, Colorado Hotel, Glenwood Springs, Colo.

of strip-mined land under the mines department alone, instead of the parent joint responsibility shared by the mines department and the Agricultural Extension Service. The performance bond for land rehabilitation would be increased from \$500 to \$1,000. Sealing of all outside openings and covering of exposed coal seams to the satisfaction of the district inspector and state mines chief on abandonment of a mine also was provided for by another bill. The present restriction against cushion blasting would be extended to other methods of blasting for which written permission of the mines department has not been obtained, according to one measure. Another calls for an increase in the pay of the regular members of mine rescue teams from \$4 to \$6 monthly and that of captains from \$5 to \$7.

TVA Sets Coal Contracts

Placing of contracts for 3,352,610 tons of coal, at a total cost of \$11,271,422, was announced Feb. 1 by the Tennessee Valley Authority. Contracts for 2,261,610 tons of coal for the TVA plant at Kingston, Tenn., was awarded to 12 firms at a total of \$8,511,657. Six companies shared in contracts totaling \$2,759,765 for 1,091,000 tons of coal for three other TVA steam plants: Shawnee in western Kentucky, Johnsonville in western Tennessee, and Colbert in northern Alabama.

And For Your Information . . .

Compromise seemed likely on a bill introduced last month in the Alabama legislature to levy a 50c per ton inspection fee on coal brought into the state. R. H. Marcus, TVA attorney, told legislators railroad fatalities would be provided at the Colbert plant to handle Alabama coal "if the Alabama mines prove to us in bids they can supply the coal needed at a competitive price." The fee would cost TVA about \$2,000,000 on the 4,000,000 tons of out-of-state coal annually used at Colbert and Widow's Creek.

Coal and coke revenues of the Chesapeake & Ohio Ry. totaled \$138 million in 1954, down 15.7% from 1953, and represented 49% of the line's total freight income. The railroad expects to maintain its position as the leading coal carrier, however, and coal's long-term future "by all standards of reckoning is bright," said Cyrus S. Eaton and Walter Tuohy, C&O chairman and president.

A bill to appropriate \$8½ million for the anthracite drainage program in cooperation with the federal government was unanimously approved Feb. 15 by the Pennsylvania Senate Committee on Mines and Mining. Meanwhile, in Washington, the House Interior Subcommittee on Mining had scheduled for March 3 the start of hearings on a bill to provide another \$8½ million in federal funds.

The Midwestern Air Pollution Prevention Association intends to raise \$100,000 for a 2-yr intensified research program into the sources of Chicago's air-pollution problem, it was announced Feb. 15 by its president, Dr. Haldon A. Leedy, vice president and director of Armour Research Foundation of the Illinois Institute of Technology.

A \$1,000,000 research laboratory to develop new markets for both anthracite and bituminous coal is called for in a bill introduced into the Pennsylvania Senate last month. In Montana, a House bill sought \$60,000 to permit Montana State College to continue its search for new coal uses, particularly for a process to convert coal into char.

Company Earnings Reports

Glen Alden Coal Co.—Year to Dec. 31, 1954 (preliminary), net income of \$181,840, equal to 1c per share, compared with 1953 net loss of \$4,934,000.

Independent Coal & Coke Co.—1954 net profit of \$724,784, compared with net loss of \$323,205 for 1953.

Peabody Coal Co.—3 mo to Jan. 31, 1955, net income of \$836,969, equal to \$1.13 per preferred share, compared with net of \$352,371, or 63c a preferred share, for the same quarter a year ago. For the 9 mo ending Jan. 31, net income totalled \$793,232, or \$1.41 per preferred share, against a net loss of \$119,664 in the 9-mo period ending Jan. 31, 1954. The third-quarter showing, even with lower sales, was partially a result of the elimination of certain non-profitable sales and increased emphasis on industrial and utility sales, it was reported. Its results "reflect for the first time the full effect of the operating efficiencies heretofore introduced and described in previous reports to stockholders," Otto Gressens, Peabody president, stated. Mr. Gressens also reported that the company expects to have a net of over \$750,000 in its fiscal year ending April 30 and would more than earn its preferred dividend requirements of \$703,260 for the first time since its 1952 fiscal year.

Truax-Traer Coal Co.—3 mo to Jan. 1955, net income of \$888,207, or 73c a common share, compared with \$903,274, or 74c a share, a year earlier. For the 9 mo ending Jan. 31, net income was \$1,628,625, or \$1.24 a share, against \$2,007,653, or \$1.59 a share, in the same period last year.

United Electric Coal Co.—3 mo to Jan. 31, 1955, net income of \$357,515, or 53c a share, compared with \$351,352, or 52c a share, in the same quarter last year. For 6 mo to Jan. 31, net income was \$535,356, or 79c a share, against \$717,081, or \$1.06 a share, in the same period the previous year.

MANUFACTURERS . . . From p 135

its business of manufacturing heavy-duty and off-highway trucks, buses and fire apparatus," company directors pointed out.

Marmon-Herrington Appoints

The Marmon-Herrington Co., Inc., Indianapolis, has appointed Edward F. Ray general sales manager of its All-Wheel-Drive Truck Div. Mr. Ray has a background of over 33 yr in the automotive industry, including 20 yr with the Ford Motor Co. Joining Marmon-Herrington in 1942 for procurement of service parts on war contracts, he was appointed assistant sales manager of the All-Wheel-Drive Truck Div. in 1948.

AC to Acquire Baker

The Allis-Chalmers Mfg. Co., Milwaukee, and Baker Mfg. Co., Springfield, Ill., announced late in January that negotiations were under way for the acquisition by Allis-Chalmers of all assets of the Baker company. W. A. Roberts, Allis-Chalmers president, and W. C. Staley, Baker president, said that while proposed sale terms or other financial arrangements could not be disclosed at that time, final arrangements were expected to be completed shortly. Later, on Feb. 9, it was announced that Baker shareholders had approved the sale of the company's assets to Allis-Chalmers in exchange for A-C stock. Allis-Chalmers will begin operating Baker's plants April 1, with all Baker employees, except its principal officers, continuing in their present posts.

Dorr-Oliver Centralizes Sales

Dorr-Oliver, Inc., has announced the centralization of its divisional sales headquarters at Stamford, Conn., Chicago, Ill., and Oakland, Calif., and the resulting relocation of six of these eight divisional head offices. Center of operations for the three eastern sales divisions will be in Stamford, including headquarters of the Eastern Industrial Div. managed by R. F. Clemens, formerly located in Wilmington; and the Eastern Filtration Div., under the direction of T. T. Meehan, previously in New York City. C. A. Knapp assumed the managerial duties of the Eastern Sanitary Div. Jan. 1. Previously in Evanston, headquarters of the Central Sanitary Div., with O. V. Lindell as manager, will now be located in Merchandise Mart in Chicago. Filtration sales in this territory will be handled by the Central Industrial Div. directed by R. A. Johnson. Located at western division headquarters in Oakland will be E. D. Flynn, acting Western Filtration Div. manager; W. T. Marston, Western Industrial Div. manager, formerly in Denver; and F. G. Nelson, in charge of the Western Div., previously headquartered in Los Angeles.

Fetzer Heads Phillips Sales

William F. Fetzer has been named general sales manager, Phillips Corp., Carnegie, Pa. In his new position, Mr. Fetzer will take over the sales duties of James M. Phillips, vice president, who will devote his full time to the development of new products and markets in



BEE-ZEE BOOSTS BTU'S



More than one coal man has told us:

"Our coal has less moisture - guaranteeing more BTU's - since we put Bee-Zee Screens on our dewatering equipment." We're always pleased to hear this - but not surprised. When efficiently-shaped top rods are spot welded to round tie rods there are no pockets or corners to hold back water. It has to run right through.

If you're heat-drying, Bee-Zee Screens will cut time and cost from that operation.

If you are not heat-drying Bee-Zee Screens are even more important; their dewatering action is the last process between your coal and the customer.

There are other ways Bee-Zee Screens make you money. They are 100% stainless steel - resisting corrosion, rust

and abrasion. They can be built for any equipment you operate, with rod shapes and spacing selected for exactly the results you want. Write, wire or phone for a complete story.



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BIXBY-ZIMMER
Engineering Co.

135 ABINGDON STREET, GALESBURG, ILLINOIS



SHUTTLE CAR CABLE

At Anaconda, we know firsthand the enemies of cable life: water, abrasion, excess tension, run-overs—in our own mines. This experience helps us make better cable for your mine use.

Get 300% longer service with Anaconda mine-tested cable

Day-in, day-out mine experience helps us make shuttle car cable that really resists enemies of cable life.

Users tell us today's Anaconda flat-twin cable lasts *3 times longer* than the cable they used only a few years ago. What makes this Anaconda cable better?

Its jacket is specially compounded neoprene. You can't tear, cut or abrade it easily. Insulation is a new crush-resistant form of rubber, making this cable tougher and vastly more flame-resistant. And an improved stranding and a brand-new ground wire make it a lot safer to handle.

Your Distributor can give you full facts. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

*Trade Mark

55320

ANACONDA®
MINE CABLE

FLAT-TWIN CABLE



Improved stranding, new insulation, new grounding wire, and neoprene jacket make this a superior cable for shuttle cars, continuous miners, loaders, drill trucks, cutters.

POWER CABLES



Anaconda Types W & G are rugged, sturdy and long-lived. Used for mine power, shovels, continuous miners, loaders, drill trucks, cutters.

SHOVEL AND DRILL CABLES



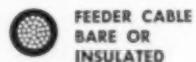
Securityflex* Types W and G are used with small shovels, self-propelled drill trucks, pumps and a-c mining equipment. For higher voltages, Type SH cables (shielded) are recommended.

SECURITYFLEX CORDS



Unexcelled for strength, wear resistance and long life. Type SO (heavy-duty) provides superior service on remote control and hand drills.

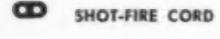
TROLLEY WIRE



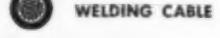
FEEDER CABLE
BARE OR
INSULATED



TELEPHONE CABLE



SHOT-FIRE CORD



WELDING CABLE

keeping with the firm's expansion program. Mr. Fetzer joined the company, formerly Phillips Mine & Mill Supply Co., after World War II in the engineering-sales department and was named assistant sales manager in 1950. R. B. Osbourne, associated with the company for 47 yr and formerly chief engineer, has been elected to the newly created post of vice president-engineering.

Schroeder Bros. Engineer

James H. Feath, formerly with the Ebensburg Coal Co., Ebensburg, Pa., has joined Schroeder Bros., Pittsburgh, Pa., as sales and service engineer. Mr. Feath will service accounts in the southern West Virginia and Kentucky area.

L-B Speeder Sales Heads

C. M. Basile has been named vice president of manufacturing and sales and Gordon W. Rowand promoted to sales manager of the Link-Belt Speeder Corp., Cedar Rapids, Iowa. Mr. Basile has been vice president in charge of operations of Link-Belt Speeder since 1950 when he transferred from the parent company, with which he had been associated since 1928. Joining the company in 1946, Mr. Rowand had served as assistant sales manager since 1953 and formerly was a district representative in the Midwest and Pacific Northwest.

Le Roi Promotes Sullivan

Paul D. Sullivan has been named assistant sales manager, Le Roi Div., Westinghouse Air Brake Co., Milwaukee. Mr. Sullivan will move from New York where he has been in charge of contractor sales since joining the division more than a year ago. He will be concerned primarily with sales of Le Roi portable air compressors and Westinghouse stationary air compressors. Before joining Le Roi, Mr. Sullivan was associated with the Gardner-Denver Co.

Cummins Names Manager

Cummins Engine Co., Inc., Columbus, Ind., has named J. P. Jung regional manager, Southeastern region, with headquarters in Atlanta, Ga. With the company since 1947, Mr. Jung served 4½ yr as assistant regional manager at Cleveland and more than a year in the same capacity at Los Angeles. Mr. Jung replaces R. P. Parshall, who has moved to Milwaukee to take over the Cummins distributorship as president of Cummins Diesel of Wisconsin, Inc.

Koehring Appoints Two

Koehring Co., Milwaukee, has appointed two new district representatives, who will represent Koehring as well as its three subsidiary manufacturing firms, Parsons Co., Newton, Iowa; C. S. Johnson Co., Champaign, Ill., and Kwik Mix Co., Port Washington, Wis. D. C. Kilpatrick, with Koehring for the last 1½ yr, has been named to a territory covering the states of North and South Dakota, Montana, Nebraska, Iowa, Minnesota, Kansas and western Missouri in addition to the Canadian provinces of Alberta, Saskatchewan and Manitoba. John E. Mahoney Jr. has been made district representative for the company's South Atlantic territory. Mr. Mahoney,

VICTAULIC METHOD OF PIPING



VICTAULIC COUPLINGS

Styles 77, 77-D for standard applications. Simple, fast to install—sturdy and reliable. Sizes ¾" to 30". Style 75 Light-Weight Couplings for light duty applications. Sizes 2", 3", 4". Additional styles for cast iron, plastic and other pipes. Sizes through 60".



VICTAULIC FULL-FLOW FITTINGS

Complete line of Elbows, Tees, Reducers, Laterals, etc.—to fit all Victaulic Couplings. Streamlined for top efficiency, easy to install. Sizes ¾" to 12".



VIC-GROOVER TOOLS

Handy, on-the-job grooving tools that do the work in half the time. Light weight, easy to handle—operate manually or from any power drive. Automatic groove position and depth. Sizes ¾" to 8".



ROUST-A- BOUT COUPLINGS

Style 99 for plain or beveled end pipe. Best engineered, most useful plain end joint on the market. Simple, husky—easy and fast to install. Takes strong bulldog grip on pipe. Sizes 2" to 8".



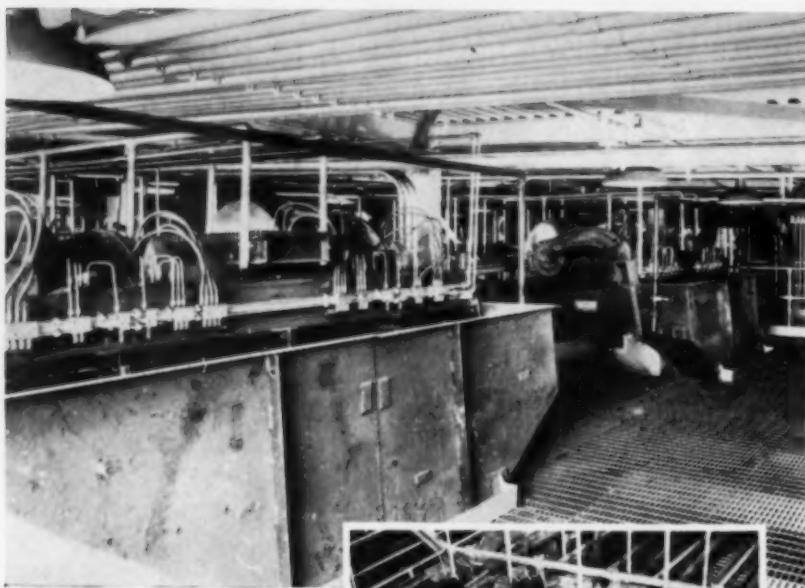
VICTAULIC SNAP-JOINTS

Victaulic's new boltless, speed coupling. — Style 78 — hinged into one assembly. Hand-locks for time and dollar savings. Sizes 1", 1½", 2", 3", 4".

EASIEST WAY TO MAKE ENDS MEET

Promptly available from distributor stocks coast-to-coast. Write for NEW Victaulic Catalog-Manual 55-3A

VICTAULIC
COMPANY OF AMERICA
P. O. Box 509 • Elizabeth, N. J.



DORR BOWL CLASSIFIERS

TOP PHOTO — Operating floor showing rack discharge ends of Classifiers.
BOTTOM PHOTO — Close-up of one machine showing part of bowl and lower rake hangers.

Largest single producer in the nation, the Robena Mine of United States Steel Corporation's Coal Division recently completed additions to their fine coal cleaning plant. Six Dorr Bowl Classifiers with quadruplex rakes and 19' dia. bowls were installed to deslime and dewater hydroseparator underflow ahead of additional treatment. Rake product from each Classifier is 15 TPH of +325 mesh coal which is upgraded on tables. The addition of this proven metallurgical processing step at Robena has resulted in an appreciably improved concentrate from the table plants which can be de-watered to a lower moisture content than previously and also contains less ash and sulfur.

We'd like to tell you more about how Dorr-Oliver metallurgical methods are now being used in modern coal preparation plants. Just write for a copy of Bulletin No. 7100 to Dorr-Oliver Inc., Stamford, Conn. No obligation, of course.



who has been with the Koehring service department since 1953, will cover a territory that includes Alabama, Florida, Georgia, North and South Carolina, Virginia and West Virginia.

New Coal-Chemicals Post

H. W. Seyler, general superintendent of the Clairton works, has been appointed assistant vice president-coal chemical operations, United States Steel Corp., Pittsburgh. In the newly-created position, established as part of U. S. Steel's increasing interest in the production of coal chemicals, Mr. Seyler will coordinate all of the corporation's coal-chemical plants. Mr. Seyler has been general superintendent at Clairton for the last 11 yr and has had a total of 36 yr experience in coke and coal-chemical plant operations.

Crowley Joins Austin Loader

The appointments of M. B. Crowley as eastern regional sales manager and Floyd Baker as western regional sales manager of the Austin Div., Central Ohio Steel Products Co., Galion, Ohio, has been announced by O. C. Henkel, president. A mining engineering graduate of the New Mexico School of Mines, Mr. Crowley was formerly associated with the Caterpillar Tractor Co., where he served as a special representative in the mining section of Caterpillar's Sales Development Div. He will be responsible for sales development of Austin Overshot loaders east of the Mississippi River, with headquarters in Galion, Ohio. Before joining Austin as a sales engineer 18 mo ago, Mr. Baker was an independent contractor specializing in dam, highway and large building construction. In his new assignment, Mr. Baker will supervise sales west of the Mississippi, with headquarters in Denver.

Raybestos-Manhattan Elects

Raybestos-Manhattan, Inc., Passaic, N. J., has elected H. H. Burrows vice president-rubber sales and S. R. Zimmerman Jr. vice president. Mr. Zimmerman, who joined the company in 1932 presently is a director and assistant general manager of the U. S. Asbestos-Grey-Rock Div., at Manheim, Pa. Mr. Burrows formerly was sales manager of the Industrial Rubber Products Div., at Passaic. He joined the Manhattan Div. in 1915, and later became manager of the roll and tank department. R. B. Hazard has been appointed sales manager-rubber and packing. Mr. Hazard formerly was sales manager of the firm's packing div.

Gardner-Denver Consolidation

Management of the Gardner-Denver Co., Quincy, Ill., and of the Keller Tool Co., Grand Haven, Mich., have announced stockholder approval of a consolidation. Keller Tool Co. has become the Keller Tool Div. of Gardner-Denver Co. and will continue operations under the former Keller management. E. V. Erickson, president of Keller Tool, has been elected an executive vice president of Gardner-Denver; with Gifford V. Leece remaining as president of Gardner-Denver. The Keller Tool Div., with two

COST-CUTTING MEMOS:



USE THE RIGHT EXPLOSIVES: Don't buy certain grades or types of explosives from force of habit! Possibly you can replace gelatins and semi-gelatins with equivalent-strength, and more economical, ammonium nitrate dynamites. Coal mines operating on short schedules should check economy of improved permissives. Stripping and open pit operations may find greatest savings in cored ammonium nitrate explosives.



USE THE RIGHT TYPE CARTRIDGE: Fluted ends on cartridges (as with Apex® above) make for easier loading of both horizontal and vertical holes with no significant loss of compaction. Spiral winding protects against cartridge rupture. Loading crews are not held up by stuck cartridges. In underground operations, Redi-Slit® cartridges mean quicker and easier loading. The right type cartridge will cut costs.



SELECT THE PROPER POINT OF INITIATION: There is much misinformation and superstition on this subject. However, many open pit operations are effecting important savings by initiating blasts at the point of maximum confinement—normally the bottom of each hole. Not only is explosives efficiency increased, but excessive air blast is avoided . . . as well as complaints and damage claims.



KEEP UP WITH THE LATEST TECHNIQUES: Blasting is continually being improved. See that your men are using the methods which work best in your particular operation. The men above are looking at "The Inside Story"—an Atlas technical movie—during their lunch hour. If you'd like to show this movie to your men, simply write us on your company letterhead. We'll arrange a showing for you at an early date.

Yes, you can cut costs with better blasting. Better blasting is simply a combination of the right explosives plus the right methods . . . for your job. Talk with your Atlas representative. Let him examine your blasting problems. He may have some ideas which can mean real savings in your particular operation.

And send us the names of the men you'd like to receive "Better Blasting." This free, informative periodical is published quarterly by Atlas to bring you technical tips and product announcements.



ATLAS EXPLOSIVES

"Everything for Blasting"

ATLAS POWDER COMPANY,
WILMINGTON 99, DELAWARE
Offices in Principal Cities

CUT SHUTTLE CAR MAINTENANCE COSTS!



the Lee-Norse DRIVE WHEEL FRICTION

FOR 5SC OR 6SC SHUTTLE CARS

- ELIMINATES DIFFERENTIALS
- ABSORBS ROAD SHOCKS
- PROTECTS ALL DRIVE PARTS

DESIGNED TO SAVE YOU MONEY in unnecessary repair bills, the LEE-NORSE DRIVE WHEEL FRICTION gives you valuable protection where you need it most . . . all drive parts are protected from destructive loads.

PREVENTS DAMAGE. A new principle of operation prevents damage to the drive by limiting the torque that can be delivered to each wheel within the safe operating range of its driving parts. Destructive road shock is absorbed by the adjustable spring-loaded multiple disc friction. In operation the shuttle car has four-wheel drive with independent wheel action at all times—without a differential. The differential may be completely eliminated.

EASY TO INSTALL. The present drive flange and shaft are removed from each wheel and the drive wheel friction is simply bolted in their place. Conversion is quick . . . easy . . . inexpensive.

GUARANTEE

Try the LEE-NORSE DRIVE WHEEL FRICTION on your shuttle cars for ninety days. If not satisfied at the end of this trial period your money will be refunded.

Lee-Norse Company

Specialists in

Coal Mining Equipment

CHARLEROI, PA.

Write today for complete information.

manufacturing plants in Grand Haven, and one in Reed City, Mich., manufactures portable pneumatic tools for various industries. Sales activities of the two companies will be coordinated to provide expert compressed air service and a complete line of products to the customers and prospects in each of the industrial fields formerly served by either company.

Federal Sales Manager

The appointment of Harry L. Norton as sales manager for the newly reorganized Federal Motor Truck Co. has been announced by M. J. McCarty, executive vice president. In this capacity he will direct all truck sales activities for the company. Mr. Norton joined the Federal sales department in 1946 when it was under other ownership. A year later he was promoted to assistant distribution manager, and in 1948, after only 2 yr with the company, became distribution manager.

And For Your Information . . .

Eugene Caillet has been appointed assistant manager of molded and extruded goods sales at the Goodyear Tire & Rubber Co., St. Marys, Ohio, plant. Mr. Caillet joined Goodyear in 1948 as a sales engineer at the St. Marys plant and was assigned to molded goods sales shortly afterwards.

The first order of National plastic pipe manufactured at the Gary, Ind., plant of United States Steel Corp.'s National Tube Div. was shipped in mid-January. It consisted of 2 and 3-in flexible pipe to be used for mine drainage. Construction of the Gary plastic pipe plant began in June, 1954, and production started Oct. 2. Initial production will be made from polyethylene in sizes $\frac{1}{2}$ to 6 in, but manufacturing facilities have been established that will eventually permit the manufacture of pipe from other plastic materials and in a greater size range. A continuing program of research and development also is being conducted with new and improved plastic materials and processing techniques.

Appointment of four new distributors for the broader Wayne line of $\frac{1}{2}$ - and $\frac{3}{4}$ -yd crane-excavators has been announced by Felix W. Sweeney, sales manager of the Wayne Shovel & Crane Div., American Steel Dredge Co., Inc., Ft. Wayne, Ind., as follows: Dravo-Doyle Co., Pittsburgh, Pa., western Pennsylvania and Panhandle of West Virginia; Cary Hall Machinery Co., Inc., Salem, Va., state of Virginia; Industrial & Farm Equipment Corp., Baltimore, Md., state of Maryland, Kent and Sussex Counties, Delaware and Washington, D. C.; George P. Williams Co., Cleveland, Ohio, northeastern Ohio.

Martin Vander Laan has been appointed assistant to Elmer C. Salzman, manager of operations of the Engineers Div., Hewitt-Robins, Inc., Stamford, Conn. Mr. Vander Laan joined the company in 1934 as a junior draftsman and has worked in every phase of conveyor design and construction in this

HERE'S REAL MATERIAL HANDLING NEWS

New STEARNS 2-coil magnetic pulley removes more tramp iron than larger units on many conveyor operations — yours may be one

Stearns now offers a powerful new electromagnetic pulley that provides exceptional tramp iron removal *throughout the entire load mass*. Two-coil design produces a magnetic field that is deepest at the center of the conveyor belt where load is heaviest. The area of magnetic attraction is the same general shape as the load on a conveyor operating under standard conveyor practices.

Pulley costs less

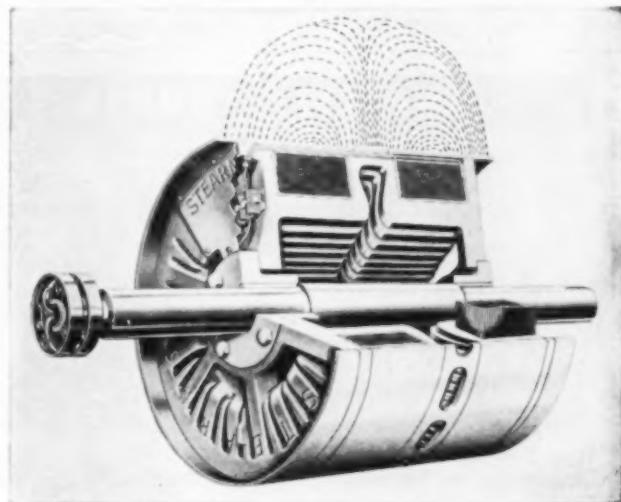
Because of the nature of the magnetic field, smaller pulleys costing less, can now be used on jobs where larger units were formerly needed. An examination of data on a number of proposed installations showed that, in the majority of the cases, the recommended new 2-coil pulley is of smaller diameter than a 3-coil pulley handling the same job.

Get all the facts on this new magnetic pulley. Find out how it simplifies pulley selection. Write for bulletin 303-C.

SIMPLIFIED PULLEY SELECTION METHOD*

Because this pulley fits right into recommended conveyor standards for speed of belt travel and depth of load for various types of materials, it is far simpler to select the right pulley than ever before. Stearns provides new selection tables in Bulletin 303-C that now make it possible for you to select the right size unit for your job even before you consult our sales engineers.

*Copyrighted 1954 Stearns Magnetic, Inc.



Cutaway showing 2-coil construction. This design provides a deeper magnet field at the center of the pulley — a pattern which conforms to normal load conditions.



Diagram showing magnetic field for 2-coil, 36-in. dia., 42-in. wide pulley. Note how magnetic field blankets entire load.



Diagram of same size 3-coil pulley. Note how center of load extends above magnetic field. Conveyor would require a larger pulley operating at slower speed in order to do an effective tramp iron removal job.

1106

MAGNETIC EQUIPMENT FOR ALL INDUSTRY

STEARNS MAGNETS

STEARNS MAGNETIC, INC., 661 S. 28th St., Milwaukee 46, Wis.



country and abroad. He recently served as a consultant to the FOA and made two trips to Europe and Africa to survey the mining and transportation of chrome ore.

John B. Dempsey, Detroit branch manager, has been appointed manager of electric tool sales of Thor Power Tool Co., Aurora, Ill. Mr. Dempsey, a member of the Thor sales department for nearly 17 yr, has also served as branch manager in Milwaukee and Pittsburgh.

William S. Stephens has joined the Materials Handling Dept. of the Syntron Co., Homer City, Pa., as an application engineer. Before joining Syntron, Mr. Stephens was district construction engi-

neer for the Pennsylvania Department of Highways. Syntron Baltimore Sales Co., district sales representatives for Syntron, has appointed Henry L. Wolfe to its sales staff. Mr. Wolfe will be located in Richmond, Va., handling Syntron equipment in the entire state.

New Books for Coal Men

First-Aid Safetygraphs

How to Control Bleeding, First-Aid Treatment for Burns and Transportation of Injured Persons. These three safetygraphs provide a ready means for training small groups. 12 pp. 18x24-in; spiral bound in leatherette portfolio. Information

and prices from the National Safety Council, 425 N. Michigan Ave., Chicago, Ill.

Coal Mine Fatalities

Coal Mine Fatalities in 1954. A detailed breakdown of the year's fatality record by States and causes. Publications Distribution Section, U. S. Bureau of Mines, 4800 Forbes St., Pittsburgh 18, Pa.

Detecting Mine Gases

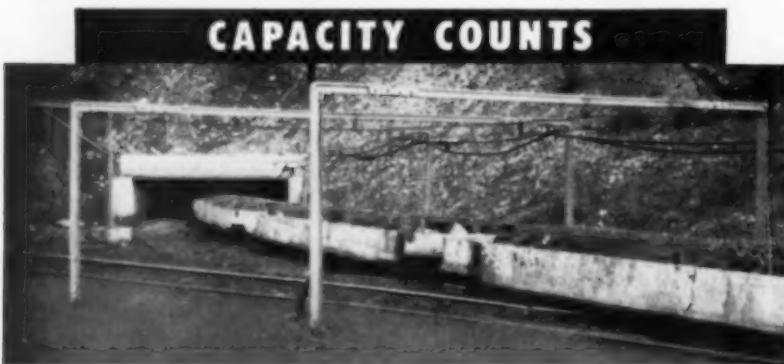
Mine Gases and Methods for Detecting Them, by J. J. Forbes and G. W. Grove. A revision of the first of a series of four Miners' Circulars originally prepared for use in training men for rescue and recovery operations. Detailed information is given on nature and occurrence of gases and methods of detection. *Miners' Circular 33*. 82 pp. 6x9-in; paper. 55c, Superintendent of Documents, Government Printing Office, Washington 25, D.C.

Preventing Accidents

Miscellaneous Accidents in Bituminous Coal Mines. A revised edition discussing causes and prevention of miscellaneous accidents and designed as a reference work for those who have taken the Bureau's courses. *Miners' Circular 60*, 40c, Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Portable Power Tools

How to Use Portable Power Tools, by Maurice Reid. Here's an up-to-date book



These two views at the Princess Elkhorn No. 1 Mine, David, Kentucky, show clearly the low height operating conditions within the mine. Differential's 24" (high) cars are really loaded—and crown-scraped—as they approach the rotary dumper (also Differential).



DIFFERENTIALS HAVE IT

The lower the entry the more clearly are Differential Mine Cars called for. The special patented "AXLESS" trucks carry payloads where other cars carry dead weight. It's a fact that within given length, width and height, you get more cubic footage than in any other make! This means fewer cars required!

It all adds up to (1) lower investment, (2) less maintenance, (3) lower operating costs. **Differentials have it on all counts!**

Send for Bulletin D-53 for details

Other Differential Products:
Locomotives, Mine Supply Cars,
Rock Larries, Mantrip Cars,
Rotary Dumpers and other
dumping devices, and Complete
Haulage Systems.

**DIFFERENTIAL
STEEL CAR COMPANY**
FINDLAY, OHIO

SINCE 1915—PIONEERS IN HAULAGE EQUIPMENT

HINGED PLATEGRIP BELT FASTENER No. 500

FOR HEAVY CONVEYOR BELTS OF CHANGING LENGTH

These heavy-duty belt fasteners make a strong, flexible joint in conveyor belts, belts of any width and of from $\frac{3}{8}$ " to $\frac{1}{2}$ " thickness. They offer special advantages in mines, quarries or industrial setups where length or position of belt is frequently changed, because sections can be removed or added at will. Joints are opened for this purpose by simply pulling out the hinge pin.

Easily and quickly applied on the job or in the shop. Special design gives deep compression into belting and smooth, flush joint.

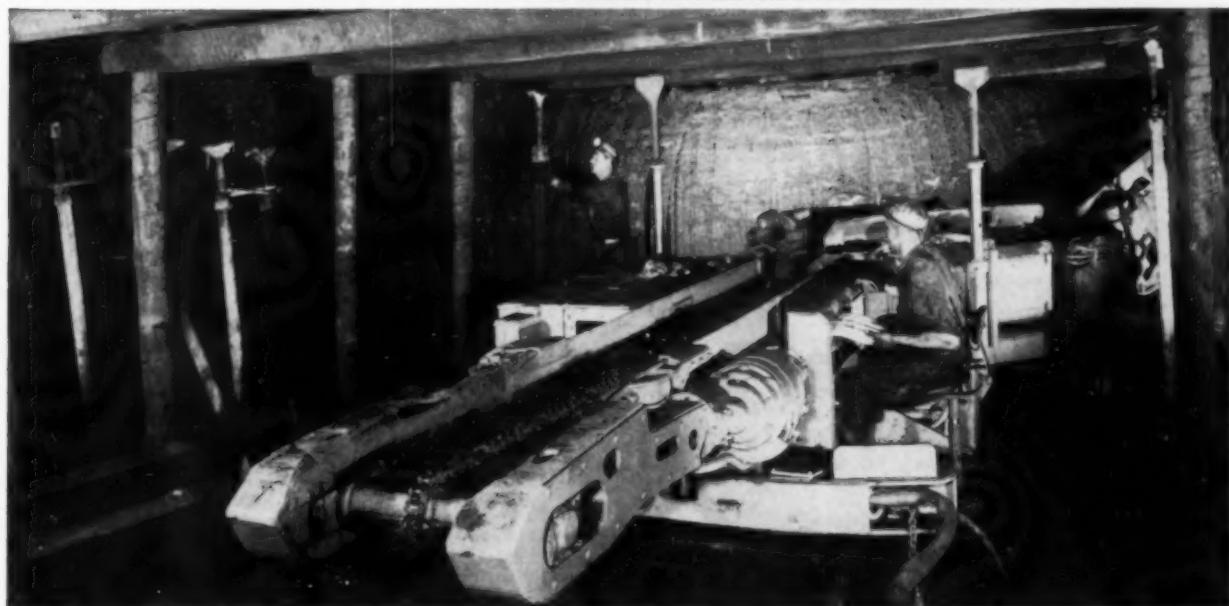
Write for Circular.



ARMSTRONG-BRAY & CO.
5340 Northwest Highway CHICAGO 30, U.S.A.



"THIS JOY 1-CM
CONTINUOUS MINER
JUMPED PRODUCTION
PER MAN PER SHIFT
ABOUT 40%!"



You Can't Argue With Results That Increase Your PROFITS

During a regular month of operation in a West Virginia mine, a Joy 1-CM-2 Continuous Miner teamed with two Joy 10-SC shuttle cars unloading on belt conveyors produced an average of 53.8 tons of raw coal per man per shift.

That represented an increase of approximately 40%! What could YOU do with something like that to bolster your profit margin?

Joy Continuous Miners and other modern mining equipment can give you the cost advantages you need. The 1-CM Continuous Miner is built for heavy-duty, high-tonnage operation in 52" coal or higher. The 3-JCM Miner, only 34" high over-all, is built for similarly high efficiency in

Consult a Joy Engineer

WAD CLASS 50

lower seams. Both are flexible, fast-tramming units.

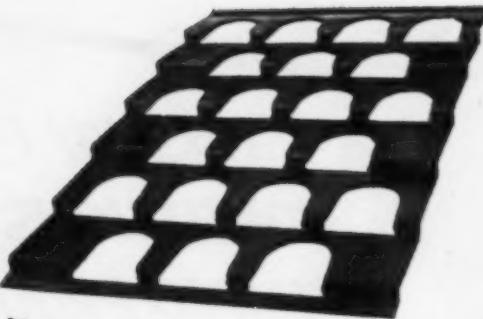
With either of these continuous mining machines, Joy Extensible Belt Conveyors are now available to give you the first truly continuous haulage in the industry. • Whatever your mining problem may be, we have the answer for you . . . let us help you work it out. **Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.** In Canada: **Joy Manufacturing Company (Canada) Limited, Galt, Ontario.**



JOY

WORLD'S LARGEST MANUFACTURER OF
UNDERGROUND MINING EQUIPMENT

How to see



through blinding costs . . .
use Hendrick flanged lip screen

Costs caused by blinding on vibrating and shaking screens are an unnecessary drain on profit. By practically eliminating costly delays due to blinding, Hendrick Flanged Lip Screen can greatly help your profit picture.

Secret of Hendrick Flanged Lip Screens' success is their tapered shape of openings and steps that provide far better separation. Equally as ideal for shaking and gravity screens and discharge chutes, Hendrick Flanged Lip Screens are furnished with openings varying in size from .010 x .025 x 1/2" to 10 1/2 x 11 1/2 x 13". The screen shown above measures 60 x 96" — perforations are equivalent in screening size to 14" diameter holes. It is being successfully used to size block coal. For more details write Hendrick direct.

Hendrick
MANUFACTURING COMPANY



41 DUNDAFF ST., CARBONDALE, PA. • Sales Offices in Principal Cities

Perforated Metal • Perforated Metal Screens • Wedge-Slot Screens • Architectural Grilles • Mitco Open Steel Flooring • Shur-Site Treads • Armogrids

NEW KERSEY BIG "E" 444E TRACTOR



FIRST AND ONLY 4 WHEEL DRIVE — 4 WHEEL STEER TRACTOR
WITH HIGHEST DRAWBAR PULL EVER OFFERED

Trailers — Cars
Exclusive Kersey
Design — Coal
Supply and Man
Trip Trailers
ANY SIZE OR
CAPACITY

SPECIFICATIONS

Weight—8,000 lb.
Length—12 ft.
Width—74 inches.
Height—24 inches.
Ground clearance—6 inches.
Turning radius—18 ft.
Tire size—6:50x10, 10 ply.

Lights—2 Sealed beam.
Motors—2 Heavy duty traction type.
Wheelbase—80-inches. Drivegear motor, direct.
Controller—Magnetic contactors.
Brakes—Hydraulic disc, Airplane type with lock.
Battery—84 Volts, 25 Kilowatt hours, in steel
trays, which will deliver six years life with
reasonable care.

KERSEY MANUFACTURING CO.
P. O. BOX 150 • BLUEFIELD, VIRGINIA • Phone 4228

describing all types of portable electric tools and attachments for specialized jobs. Included are step-by-step instructions on uses and 180 instructive photos. 200 pp. Library edition, \$2.95. Thomas Y. Crowell Co., New York, N. Y.; unabridged edition, \$1.50, Porter-Cable Co., 55 Exchange St., Syracuse 8, N. Y.

Rapid Depreciation

New Rapid Tax Depreciation—What It Means to You, by Williard F. Stanley. Characterized as "one of the most important developments in the American economy in the last decade," the new rapid tax depreciation permitted by the 1954 internal revenue code can save you considerable money—and again may not, depending upon the circumstances. In general the opportunities for savings outnumber the situations where acceleration does not represent an advantage. Mr. Stanley, among other things, discusses the pros and cons of adopting one of the new rapid tax-depreciation methods, which method to adopt, and how to handle the accounting for the deferred taxes. 153 pp. \$15.00. Prentice-Hall, Inc., 70 5th Ave., New York 11, N. Y.

Developing the Tractor

Fifty Years on Tracks, latest in a growing list of corporate histories, is the story of the Caterpillar Tractor Co. and the progressive development of tracklaying machines designed to increase efficiency in farming, earthmoving and other industries. The illustrated book is published by Caterpillar Tractor Co. to commemorate the 50th anniversary of the crawler tractor in 1954. The first machine was produced by a Caterpillar predecessor, Holt Mfg. Co., Stockton, Calif. 104 pp; clothbound. Available from Caterpillar dealers at \$1.25.

Coal-Fired Brooding Systems

A Comparison of Coal-Fired Brooding Systems, by D. W. Francis, K. C. Seeger, A. T. Ringrose and E. F. Waller. A description of results from tests with the stoker-fired Shenandoah system using



COAL MEN ON THE JOB . . .

GUYAN EAGLE COAL CO.: Dan Cook, in charge of the company's central warehouse, Amherstdale, W. Va.

NEW “KING-SIZE” CARTRIDGES SAVE TIME AND LABOR

Now, Hercules produces “King-Size” cartridges in lengths of 24, 20, 16 and 12 inches, and in diameters of 1½, 1¾, 2¼, and 2 inches.

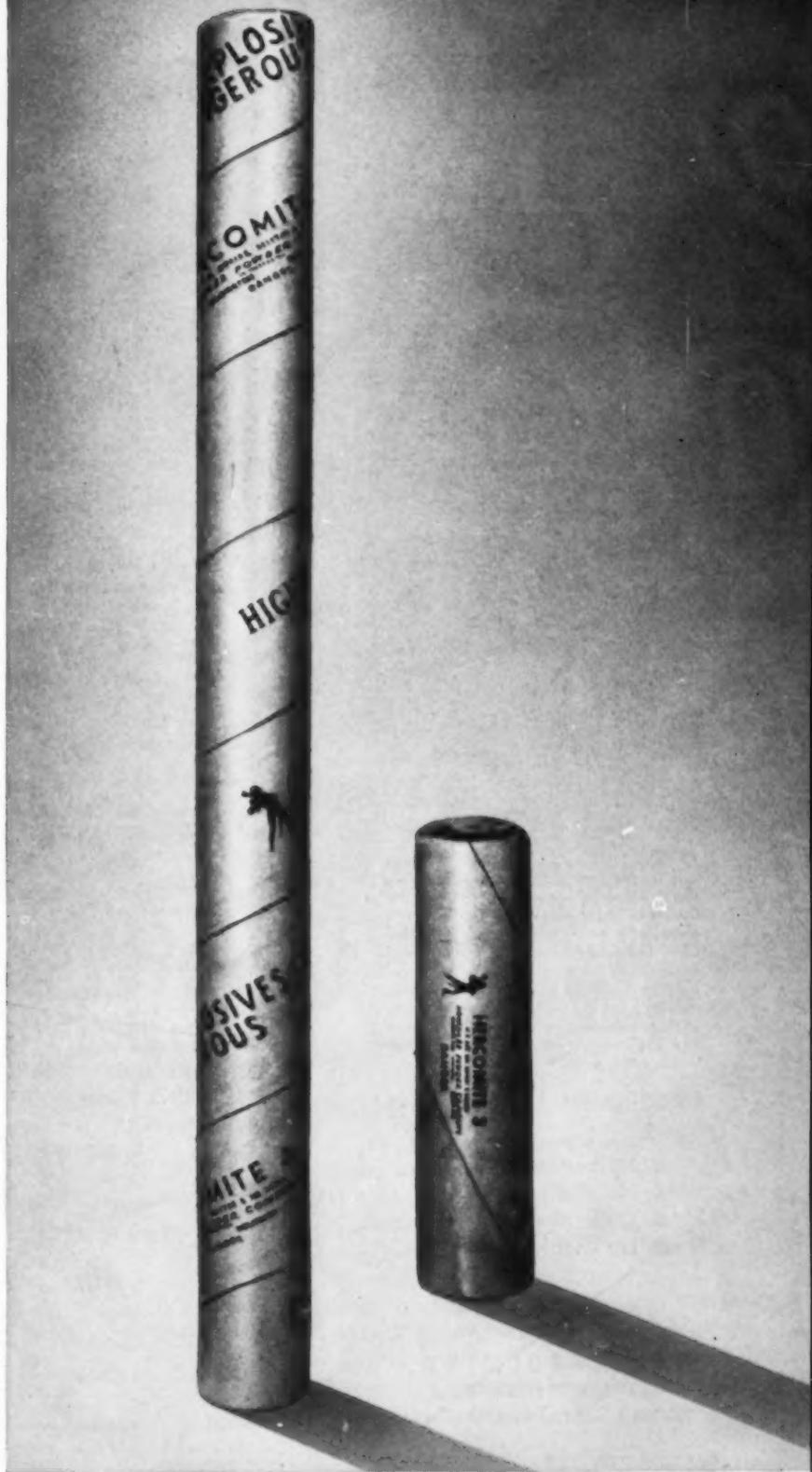
Available in all types of Hercules® dynamite, these long-length, small-diameter cartridges are now in full production.

“King-Size” cartridges make possible a more uniform fragmentation through the discharge of a single column of explosive. Their use means substantial savings in valuable time and labor in loading holes.

Hercules designed, tested, and installed special new packing machines for these “King-Size” cartridges.

Our technical service and sales representatives will be glad to discuss with you how these “King-Size” cartridges can go to work for you.

HERCULES



THREE TIMES AS LONG... Here is one of the new “King-Size” Hercules cartridges—24 inches in length, shown alongside the same grade in the conventional 8 inch size.

HERCULES POWDER COMPANY

Explosives Department, 936 King St., Wilmington, Del.

Birmingham, Ala.; Chicago, Ill.; Duluth, Minn.; Hazleton, Pa.; Joplin, Mo.; Los Angeles, Cal.; New York, N.Y.; Pittsburgh, Pa.; Salt Lake City, Utah; San Francisco, Cal.



Stick Free CORE SHELL

**multiples
mechanical operating life
5 to 6 times**

PRE-SET TAMPER PROOF
TIMER-RELAY



A unique one-piece drawn core-shell with embossed guide points increases the mechanical operating life of the Durakool Timer-Relay five to six times, practically putting it in a "fail-safe" class. These relays are available in single or multiple units with single unit capacities of 10, 30 and 60 amperes. Time delays from 0.15 to 20 seconds—any operate-release time combination. These new 1955 relays are now in production —no extra cost.

**GUARANTEED FOR AC-DC APPLICATION
and:**

- No plunger sticking
- No chatter
- Quiet operation
- No double contacting

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Durakool

ALL-STEEL MERCURY

Timers



COAL MEN ON THE JOB . . . At B&Z Safety Meeting

FEATURE of the January Meeting of the Holmes Safety Chapter of the Moss Hill mine of the Bell & Zoller Coal Co., held in Mortons Gap, Ky., was a demonstration on static electricity given by Sanford Douglas, USBM electrical engineer. Some 60-odd persons attended the meeting. Among the officials and guests participating were: James A. O'Conner (left), USBM engineer; George Blalock, superintendent, Moss Hill mine; Dewey Turley, president, Moss Hill Safety Chapter; Luther Furgerson, president, UMWA Local 4615; Mr. Douglas; Herman E. Knight, general superintendent West Kentucky Div., Bell & Zoller Coal Co.; Jess Lovelace, secretary-treasurer, UMWA District 23; and James Phalan, Kentucky State Dept. of Mines & Minerals.

bituminous coal and individual coal stoves for brooding chicks, including cost of fuel and labor, maintenance and re-

placement. Bulletin 309 (technical), 16 pp. 6x9-in; paper. No price quoted. Agricultural Experimental Station, University of Delaware, Newark, Del.

Report of Research and Technologic Work on Coal and Related Investigations July 1, 1952 to Dec. 31, 1953, by R. L. Brown and E. P. Carman. USBM, I. C. 7699. 102 pp. 8x10½-in. Free, Supt. of Documents, Government Printing Office, Washington 25, D.C.

Smoke Group Elects; Cites Committee Progress

Harry G. Kennedy, secretary, Kanawha Coal Operators' Association, Charleston, W. Va., was elected chairman of the Executive Committee of the Coal Producers' Committee for Smoke Abatement at its annual meeting in Cincinnati, succeeding the late Ezra Van Horn. George G. Ritchie, coal traffic manager-engineering, Chesapeake & Ohio Ry. Co., Richmond, Va., was elected vice chairman, and H. B. Lammers and R. L. Ireland were re-elected chairman and vice chairman, respectively, of the General Committee. J. E. Tobey, president of Appalachian Coals, Inc., was named secretary-treasurer of the Committee to succeed George F. Kisker, president of Trux-Traer Coal Sales Co., who had held the post since the Committee was organized in 1941.

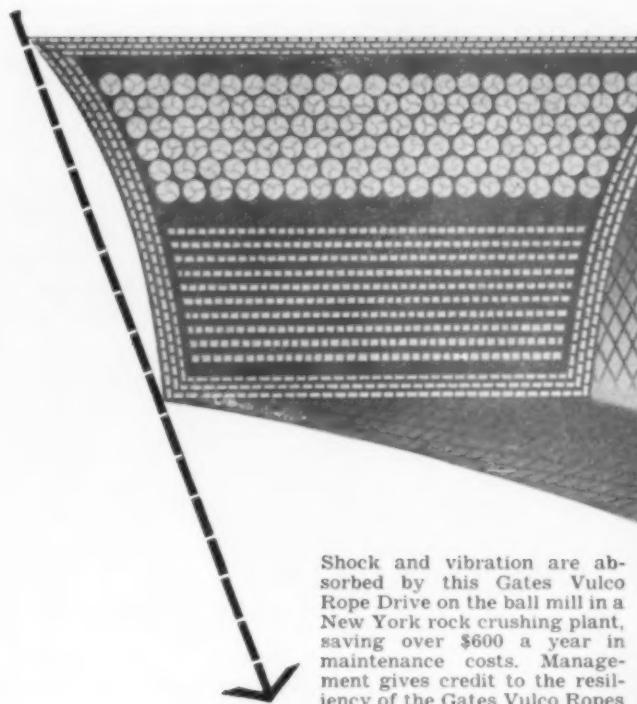
In discussing the group's progress, Mr. Lammers pointed out that more and more Chambers of Commerce have sought assistance in solving their cities' air pollution problems and that as a result the committee is being "invited" into leading coal burning plants. This means that

it's yours-all yours

Kleenslot
REG. U. S. PAT. OFF.
WEDGE WIRE MAKES MARCEL-TYPE SCREENS FOR
DEWATERING
SIZING
AND SCREENING OPERATIONS

This screen has a marcel type of construction. Specially designed for rough and abrasive type of materials, gives long life, non-blinding operation and still presents a flat surface for materials to wipe the opening CLEAN. The same dewatering efficiency is prevalent and we might add that this screen was also designed for operations where slivers of materials passing through are objectionable in the end product. Made in all sizes and shapes wherever applicable to higher and productive efficiency.

**Wedge-Wire
CORPORATION**
Gas Street at Nickle Plate R. R.
Wellington, Ohio



Shock and vibration are absorbed by this Gates Vulco Rope Drive on the ball mill in a New York rock crushing plant, saving over \$600 a year in maintenance costs. Management gives credit to the resiliency of the Gates Vulco Ropes and to their concave sides for the many years of dependable service they have given.



Concave sides keep belt costs down!



Fig. 1

Industry is saving thousands and thousands of dollars every year by specifying Gates Vulco Ropes—the V-Belts with *concave sides* (U.S. Pat. No. 1813698).

Here's the interesting reason why Gates belts save money:

On the bend around the sheave the *precisely engineered* concave sides (Fig. 1) of the Gates belt fill out and become straight (Fig. 1-A).

Thus the belt makes uniform contact with the sides of the pulley. That means sure pulling power and *even distribution of wear*. Longer wear, fewer replacements cut belt costs...reduce down time...contribute to profits.



Fig. 1-A



Simple test proves value of concave sides

Bend a straight-sided belt (Fig. 2) and feel the sides *bulge out* around the bend. The bulging sides prevent the belt from fitting evenly in the pulley groove (Fig. 2-A). Uneven contact causes uneven wear...shortens belt life...increases costs.

Keep belt costs *down* by specifying Gates Vulco Rope Drives—the V-Belt with *concave sides*. Belts you need are readily available from nearby distributor stocks. The Gates Rubber Company, Denver, Colorado—*World's Largest Maker of V-Belts*.

Gates Engineering Offices and Distributor Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world...

TPA 25-B

GATES VULCO ROPE DRIVES

MAXIMUM CARRYING CAPACITY

Collyer

TWIN PARALLEL
TYPE G

Maximum power is delivered with maximum protection through this super-dependable Collyer Cable. Ask for complete details, samples and prices . . . or tell us about your own particular power problems.



COLLYER INSULATED WIRE CO., 245 ROOSEVELT AVENUE, PAWTUCKET, R. I.

EQUIPMENT APPROVALS

Nine approvals of permissible equipment were issued by the U. S. Bureau of Mines in January, as follows:

Joy Mfg. Co.—Type 128U10-1E loading machine; five 4-hp motors, 250 v, DC; Approval 2-1031; Jan. 12.

Goodman Mfg. Co.—Type 571-48 cable-reel shuttle car; two 15- and one 10-hp motors, 250 v, DC; Approval 2-1032; Jan. 14.

Goodman Mfg. Co.—Type 401 miner; one 50- and one 100-hp motor, 250 and 500 v, DC; Approvals 2-1033A; Jan. 19.

Goodman Mfg. Co.—Type 570-10 cable-reel shuttle car; three 10-hp motors, 250 v, DC; Approval 2-1034; Jan. 19.

Goodman Mfg. Co.—Type 570-11 cable-reel shuttle car; three 10-hp motors, 250 v, DC; Approval 2-1035; Jan. 19.

Gardner-Denver Co.—Type WBQ 6x4 $\frac{1}{2}$ x5 two-stage air compressor; 50-hp motor, 250 v, DC; Approval 2-1036; Jan. 24.

Joy Mfg. Co.—Type ICM-4H continuous miner; two 65-, one 15-, and four 7 $\frac{1}{2}$ -hp motors, 440 v, AC; Approval 2-1037A; Jan. 27.

The Long Co.—Long Model 88 Loader-Long PT Piggyback conveyor combination; one 22- and one 4-hp motor, 220 and 440 v, AC. Approvals 2-1038 and 2-1038A; Jan. 28.

Plymouth Locomotive Works—Type FMD diesel locomotive, 5-ton; Approval 2203 under Schedule 22; Jan. 28.

reception from plant management is better and "through surveys made by the Coal Producers Committee for Smoke Abatement the word finally has gotten around that smoke abatement is a paying proposition," Mr. Lammers continued. "It pays off not only in increased coal burning efficiency but also in improved public relations.

"Today the recommendations made by the Committee engineers to abate smoke and improve efficiency are followed completely or in part by more than 65% of the plants visited in any city. In some cities this has run as high as 90%. This means that these plants are now more satisfied with coal and that oil or gas will have less chance of success in talking about conversion.

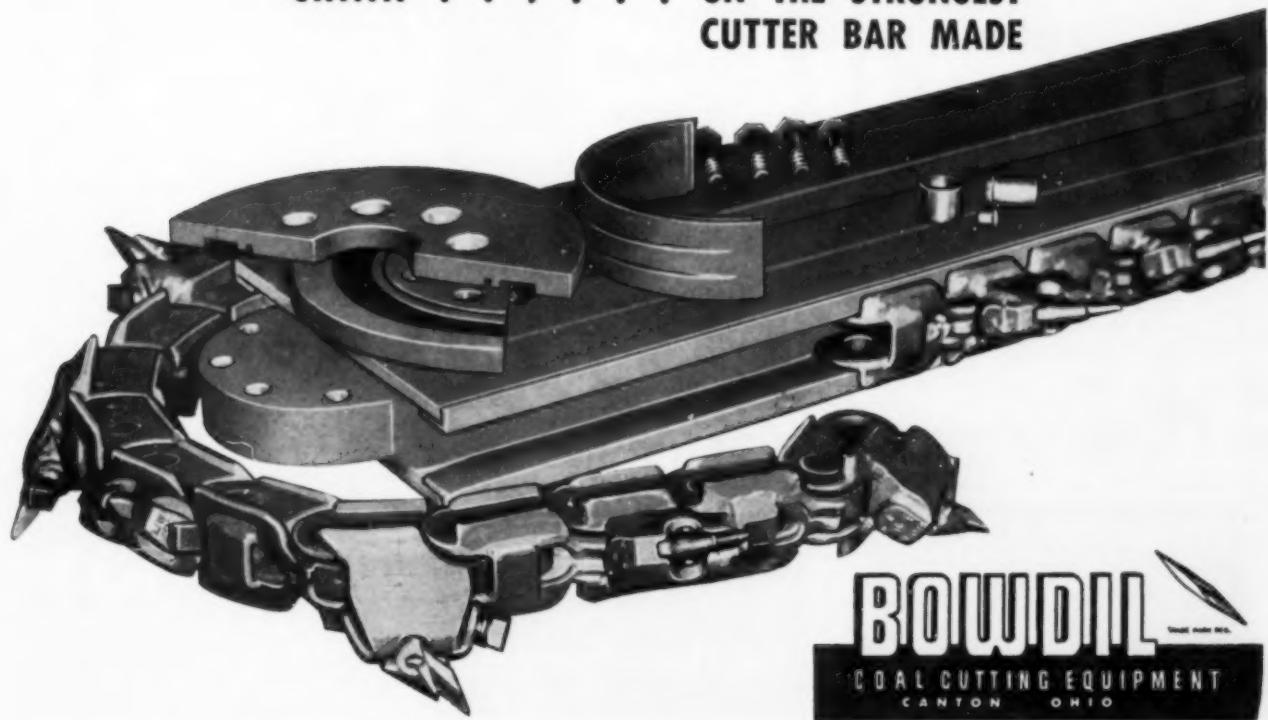
"Smoke has become the best possible entree to the ailing plant," Mr. Lammers concluded. "Because of smoke the Committee's staff is enabled to enter hundreds of plants—almost 1,000 during 1954—many of which because of their condition are perfect prospects for conversion to competing fuels. These plants are now being saved for coal. Previously they were lost by default."

THIS IS THE POINT
WHERE
PROFITS
BEGIN

\$ YOU'LL FIND YOUR
GREATEST ECONOMY
IN BOWDIL BITS



HELD BY THE
LONGEST LASTING
CHAIN ON THE STRONGEST
CUTTER BAR MADE



BOWDIL
COAL CUTTING EQUIPMENT
CANTON OHIO

**Teamed up for...
Faster, Safer
DRILLING!**

SCHROEDER
Hydraulic
COAL DRILL

MODEL
12-B

Safe, dependable, fast drilling with complete safety . . . no spark, no kick . . . all electrical hazards removed yards from drill. Light weight Model 12-B is powered from hydraulic systems of standard mining equipment or can be furnished with Schroeder Tricycle Hydraulic Mobile Power Unit. Features minimum of operating parts and reduced maintenance costs.

SCHROEDER BH DRILL BIT

For hydraulic hand-held coal drills, assures faster drilling with less effort as a result of . . .



**BH-1
BIT**

1. Reduced area of penetration for ease of feed.
2. Greater clearances reduce drag.
3. Heat treated forged steel bit body.
4. Tough carbide tips hold cutting edge longer.

Send today for details and prices.

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PITTSBURGH 1, PA.

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HYDRAULIC, ELECTRIC & PNEUMATIC
MINING EQUIPMENT

Personal Notes

Barton Gebhart and Earl Snarr, vice presidents of the Chicago, Wilmington & Franklin Coal Co., have been elected vice presidents of the Freeman Coal Mining Corp., and J. J. Riley, CW&F sales manager, has been appointed to the vacant post of sales manager for Freeman. Frank Nugent, Freeman executive vice president, announced Feb. 17, CW&F will function as the Orient Coal Div. of the Freeman Coal Mining Corp., it was announced at the same time by Col. Henry Crown, chairman of the Material Service Corp., parent company of Freeman. Acquisition of CW&F and plans to combine its production with that of Freeman to make the firm the largest producer of Illinois coal were announced by Col. Crown in January. Both the production and sales organization of the two firms will be combined, Stuart Colnon, Freeman president, reported.

Appointment of George Snyder as electrical and mechanical engineer, United Pocahontas Coal Co., Crumpler, W. Va., has been announced by Norton Stone, general manager. Mr. Snyder takes the place of his father, J. C. "Kir" Snyder, who has been retained in an advisory capacity in the maintenance department.

Hubert A. Cassell, superintendent of the Itmann mine of the Pocahontas Fuel

Co., Inc., has been named division superintendent for the company. Peter P. Ferratti, general superintendent of mines, announced last month. A veteran of 47 yr in coal mines, Mr. Cassell joined the company in 1913 and had served as a mine superintendent since 1927. In his new post, Mr. Cassell will be in charge of the supervision and planning for the company's Amonate, Bishop and Itmann mines, all fully mechanized mines built to produce 10,000 tpd or more. Succeeding Mr. Cassell as Itmann superintendent is Grover L. Asbury, who has been assistant superintendent s'nce Dec. 1, 1954. Mr. Asbury served as section foreman and general mine foreman at Itmann from February, 1950, to January, 1952, and had been assistant superintendent at the Bishop mine from May, 1953, until his return to Itmann. Michael M. O'Brien has been named assistant superintendent at Itmann, to replace Mr. Asbury. Mr. O'Brien joined Pocahontas Fuel in June, 1951, following h's graduation from West Virginia University with a BS in Mining Engineering and had served as assistant mine foreman and general mine foreman before h's latest appointment.

Donald Saxton, general superintendent, Georgetown No. 12 mine of the Hanna Coal Co., Div. of Pittsburgh Consolidation Coal Co., Adena, Ohio, has resigned to become vice president of Compton, Inc., Clarksburg, W. Va., manufacturer of Compton coal augering machines and operator of mining properties in West Virginia.

Lewis E. Evans, of Ebensburg, Pa., formerly labor commissioner for UMWA District 2, has been appointed Pennsylvania Deputy Secretary of Mines for the bituminous region. Mr. Evans, who will have offices in Ebensburg, succeeds W. Garfield Thomas.

The election of Clinton C. Cornelius as operating vice president of the Baton Coal Co., Pittsburgh, Pa., was announced Feb. 21 by Charles B. Baton, president. Mr. Cornelius, who has been general superintendent for several of the operating companies, will be in charge of operations for the Greensburg-Connellsburg Coal Co., which owns the Hubbard and Francis mines; Joanne Coal Co., which owns the Joanne mine; Farm Coal Co., owner of the Home mine; and the Carpenterstown Coal & Coke Co., owner of the Carpenterstown mine and Standard ovens. Mr. Baton also announced the appointment of Edmond A. Watters Jr. as vice president of Geo. S. Baton & Co., active as consulting engineers since 1900. Mr. Watters, who also will act as chief engineer for the Baton Coal Co., succeeds L. O. Lougee, who retired Feb. 1.

T. C. Dewey, formerly m'n'g engineer, Colonial Coal Mining Co., Madisonville, Ky., has been named superintendent of the Osage mine of the Osage Coal Co., Steamboat Springs, Colo. He replaces G. E. Ralston, who has been

If you
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materials
in your
business
it will pay
you to
investigate



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STANDARDIZED
BELT CONVEYORS**

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AURORA, ILLINOIS, U. S. A.



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1 BETTER COAL DRYING

...so much better, in fact, that C-M-I Dryers are piling up new records for economy and efficiency in preliminary dewatering operations.

...so much better that C-M-I Dryers are not only replacing costly heat drying in preliminary dewatering but, in many cases, are eliminating entirely the need for heat drying.

2 BETTER SLURRY RECOVERY

Marketable coal—thousands of tons of it—is being reclaimed from slurry by C-M-I Continuous Coal Dryers at a cost so low as to make this operation extremely profitable. Yes—slurry reclamation CAN be profitable—when done the C-M-I way. Find out HOW and WHY ...

SEND FOR FREE BROCHURE ▶

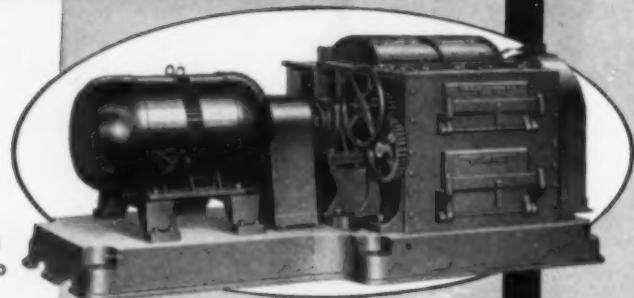
CENTRIFUGAL & MECHANICAL INDUSTRIES, INC.

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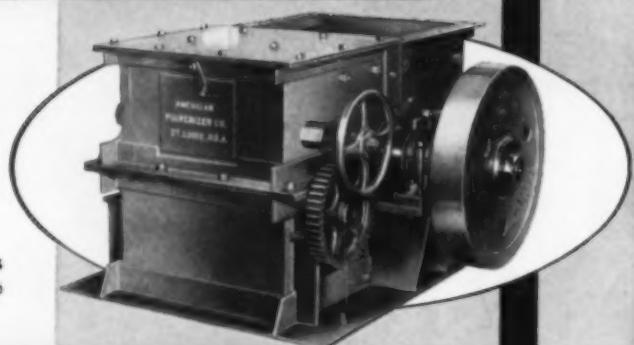
When You Figure...

AC Series
capacities to
800 TPH



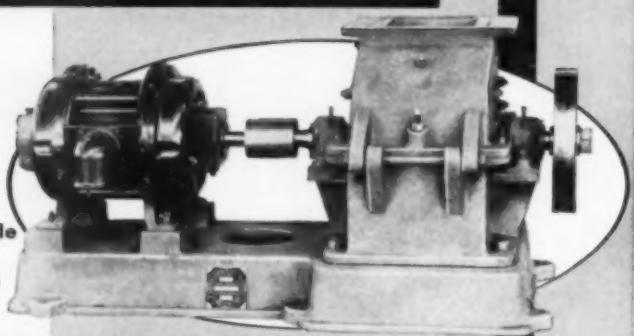
Reduction Cost Per Ton...

WC Series
capacities to
90 TPH



the Best Answers*...

Coal Sample
Crushers
capacities to
2000 Lbs.
Per Hr.



Come from American Ring Coal Crushers

*In a recent independent survey, it was found that American Crushers reduced over 61,000,000 tons of coal at a parts replacement cost (including standby parts) of less than 1/10th of 1¢ per ton.

THERE CAN BE NO BETTER PROOF OF AMERICAN QUALITY!



WRITE for Literature on These Crushers

Manufacturers of Ring Crushers and Pulverizers

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named manager of a property in western Kentucky.

John A. Reeves, assistant superintendent, Kennilworth (Utah) mine of the Independent Coal & Coke Co., has resigned to become mining engineer at the Soda Springs phosphate operation of the Monsanto Chemical Co.

Henry A. Dierks, until 1952 vice president and general manager of the Glen Alden Coal Co., has announced the availability of his services for consultation on mine development, all phases of operation, cost and production studies, mine management and valuation. To make available the widest scope of service possible, Mr. Dierks also is affiliated with Associated Engineers, Inc., Mining, Civil and Sanitation Engineers, with offices at 631 Charles Ave., Kingston, Pa., and 14 Northfield Ave., W. Orange, N. J. Mr. Dierks' experience encompasses some 40 yr in all phases of mining operations and management in potash and lignite mines in Europe, coal mines in foreign countries and in the anthracite region of Pennsylvania.

Joseph A. Corgan has been appointed chief of the Anthracite Branch of the U. S. Bureau of Mines, Washington, D. C. Well known in the anthracite industry, Mr. Corgan became associated with The Hudson Coal Co. following his graduation from Pennsylvania State University in 1929. He joined the Bureau in 1939 and worked with the industry on anthracite distribution during World War II.

Robert J. Freehling has been appointed general counsel for the Federal Coal Mine Safety Board of Review, succeeding J. Forsythe who resigned to become chief counsel of the Senate Labor Committee. Active in legal work for the government for more than 10 yr, Mr. Freehling previously has been with the NLRB, Federal Security Agency and others.

John R. Hoffert, chief sanitary engineer in the Bureau of Sanitary Engineering of the Pennsylvania Department of Health, retired in December after 35 yr of service with the state. A graduate of Cornell University, Mr. Hoffert served from 1927 to 1946 as assistant secretary and then secretary of the state Sanitary Water Board and helped launch the Board's "Clean Streams Program."

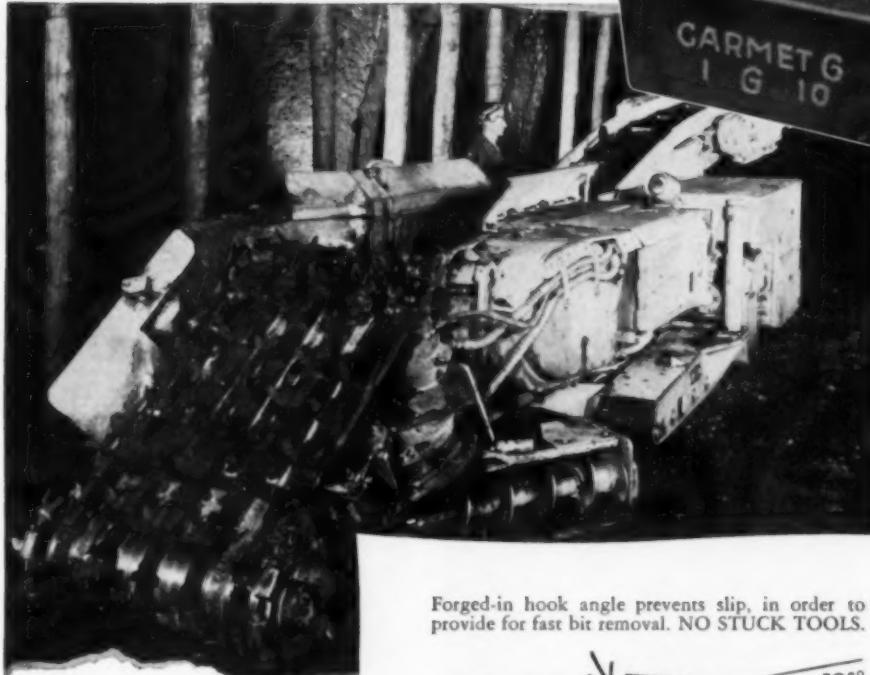
G. A. Shoemaker, executive vice president, Pittsburgh Consolidation Coal Co., Pittsburgh, Pa., was elected a board member of the National Industrial Conference Board at the Board's 356th meeting held in New York Feb. 17. Founded in 1916, the Conference Board is an independent, non-profit institution for business and industrial fact-finding through scientific research, supported by over 3,300 subscribing associates.

Obituaries

R. E. Jamison Sr. died Jan. 21 at Greensburg, Pa., following a long illness. Active in the bituminous coal industry

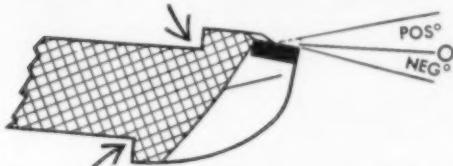
NEW CARMET "G" SERIES

CARBIDE BITS for CONTINUOUS MINING MACHINES



"THE
BEST
YET!"

Forged-in hook angle prevents slip, in order to provide for fast bit removal. NO STUCK TOOLS.



Forged from alloy steel and heat-treated; shank is $\frac{1}{2}'' \times 1''$ in size, with $1\frac{3}{4}''$ GAGE STOP.

The strongest cutting tip design: tip rake angles furnished to suit any cutting conditions; each tip double-bonded in its seat, top and bottom, with overlaying cap of steel. Braze at back of seat actually provides a triple-bond, for greatest protection against tip loss.

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Write for your copy of
"CARMET MINING TOOLS"
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Here's what a major mining company in Pennsylvania says: "Carmet has proved to us that all carbide bits are not the same. We have reduced our bit costs by at least 25%. Carmet is saving us money every day!"

Carmet's years of experience in developing bit and shank materials, designs and fabricating techniques will pay off for you, too. In addition to

the new "G" Series for continuous mining machines, Carmet distributors can offer you the widest line of carbide cutter and drill bits in the industry.

• Let them show you the Carmet way to lower tool cost and increased production. *Allegheny Ludlum Steel Corporation, Carmet Division, 1500 Jarvis Avenue, Detroit 20, Michigan.*

The Original DOUBLE-BONDED Carbide Bit

CARMET®

WAD 9551

Resistor life depends on adequate ventilation...

Patented P-G Grid
Design assures
maximum ventilation

Designed to fit
your present
resistor space.

Resistor life depends on adequate ventilation and how efficiently heat may be dissipated . . . P-G grid design equalizes the amount of air space surrounding each leg or loop to obtain even heat throughout the grid area. (Note illustration.) . . . Since heat is rapidly and evenly dissipated, hot spots fail to develop and longer resistor life is assured . . . For a nonbreakable resistor (only steel and mica used) specify P-G on your next application.



The Nonbreakable Steel Grid Resistor

THE POST-GLOVER ELECTRIC COMPANY

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during his entire business career and well known throughout the industry for his interests in its affairs, Mr. Jamison was president of the Jamison Coal & Coke Co. for many years. He served as a director of the National Coal Association from 1939 to 1951 and also on its executive and finance committees for some years. Mr. Jamison was one of the founders of Bituminous Coal Institute and headed its operating committee for a period of time.

Norman B. Perkins, 76, operator of extensive coal properties in eastern Kentucky and Tennessee, and one of the organizers of Appalachian Coals, Inc., died Feb. 5 at his winter home in Orlando, Fla. A resident of Williamsburg, Ky., Mr. Perkins was executive vice president and general manager of the Southern Mining Co.'s mines in Bell County, Kentucky, and president of the Perkins-Bowling Coal Co., Knott County, Kentucky. He also was chairman of the board of the Perkins-Harlan Coal Co., Williamsburg, and secretary of the Southern Coal & Coke Co., Knoxville.

W. Dale Hawley, 52, division manager for the high volatile mines, Coal Div., Eastern Gas & Fuel Associates, Beckley, W. Va., died Jan. 29 in University Hospital, Charlottesville, Va., following an illness of several weeks. Mr. Hawley joined EG&FA in February, 1953. Previously for some 27 yr, he had held posts as supervisor, engineer and superintendent for various mining organizations in the Beckley area.

Carl R. Fix, 46, chief electrician and maintenance supervisor for the Sterling Smokeless Coal Co., Whitby, W. Va., and the Mt. Hope Coal Co., Mt. Hope, W. Va., was found dead Jan. 27 in his hotel room in Barboursville, W. Va., while on a business trip. Death was attributed to a heart attack.

Association Activities

Colo.-N. M. Operators Meet

J. F. Lake, president of the Osage Coal Co., Steamboat Springs, Colo., was elected president of the Colorado & New Mexico Coal Operators' Association at its annual meeting held in Denver Jan. 26. Other officers elected by the group include: first vice president, J. S. Besser, manager of sales, Fuel Dept., Colorado Fuel & Iron Corp.; second vice president, Claude P. Heiner, president, Minerals Development Corp.; and treasurer, O. M. Hanks, Colorado & Utah Coal Co.

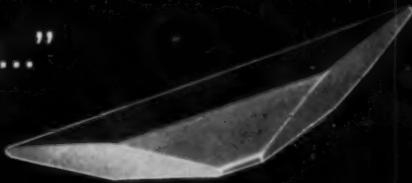
Anthracite Head Re-Elected

Frank W. Earnest Jr. was re-elected president of the Anthracite Institute at the annual meeting of the organization's board of directors held in Wilkes-Barre Jan. 24. Other officers renamed for 1955 were: J. D. Jillson, vice president and secretary; Norman F. Patton, treasurer; and R. S. Patterson, assistant secretary-treasurer. Mr. Earnest has served as president of the Anthracite Institute since 1946.

"We use CINCINNATI DUPLEX BITS exclusively..."



For all-purpose cutting, the Duplex Bit offers the best obtainable value in cutterchain bits. It is available in various grades and excels because it is reversible and double ended . . . has sharp points and keen cutting edges . . . has long life . . . locks securely . . . easily removed . . . in short it's the most economical bit for all-purpose cutting.



"We prefer CINCINNATI CARBIDE TIPPED BITS"



Cincinnati Mine offers an exceptionally broad line of precision CINIDE BITS with tungsten carbide inserts. Drop forged steel bit shanks are machined to close tolerances and are selectively heat treated to provide the right combination of hardness and toughness.



"CINCINNATI STANEX BITS work best for us..."



The Stanex Bit used in conjunction with the Stanex Holder is a low cost bit of the throw-away type possessing many of the advantages of the Famous Cincinnati Duplex Bit . . . recommended where cutting conditions are favorable.



STANEX BIT AND HOLDER

CINCINNATI . . . A PIONEER IN THE MANUFACTURE AND DESIGN OF ALL TYPES OF CUTTER BITS OFFERS THE BEST BIT FOR EVERY CUTTING CONDITION

FOR more than a quarter of a century we have concentrated on familiarizing ourselves with coal cutting problems in all types of mines in order to better serve the industry. Today, because of the untiring efforts of our field men, our engineers, and our metallurgists, we offer you the most complete and efficient line of coal cutting bits ever manufactured by a single producer of coal cutting equipment. We are proud that we are not only pioneers but specialists in the design, manufacture, and heat treating of bits that have met the challenge of the industry. If at any time you have a particular cutting problem, we at Cincinnati Mine along with our representatives are at your service.



DUPLEX F-TYPE . . . PLAIN

This bit gives you dependable service under the toughest cutting conditions (where other bits have failed) due to its specially reinforced tip which provides a stronger cutting point.

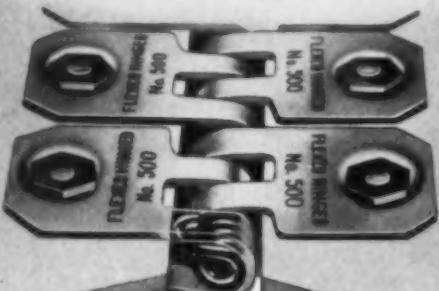
DUPLEX F-TYPE TIPPED BIT

Where cutting conditions are favorable to tipped bits, an exclusive "Cincinnati" process makes this the lowest cost throw-away type carbide tipped bit available.



the **CINCINNATI** MINE MACHINERY CO.
CINCINNATI 25, OHIO

... the new separable
**FLEXCO HINGED
BELT FASTENERS**



U. S. Patent No. 2,477,855

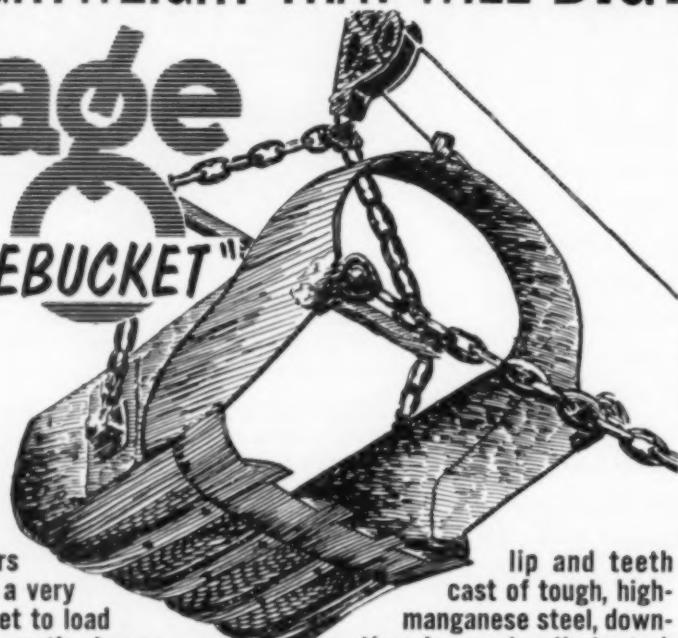
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lip and teeth cast of tough, high-manganese steel, down-time is nearly eliminated. It's a Page Automatic so you know it will dig. Write Dept. E

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BCR Meeting to Stress Market-Building Research

How coal and allied industries are using research as a market-building device will be discussed when Bituminous Coal Research, Inc., holds its annual meeting April 13 at the William Penn Hotel in Pittsburgh, Pa. BCR's Second Techno-Sales Conference, whose objective is to help correlate the industry's research activities to coal's market-building efforts, will be held on April 12.

Clifford Hood, president, U. S. Steel Corp., will address the members' annual luncheon and Earl P. Stevenson, president of the Arthur D. Little firm of research consultants, will be the speaker at the Techno-Sales Conference luncheon. Mr. Hood's subject will be "The Role of Research in the Steel Industry," and Dr. Stevenson will discuss "The Importance of Research to Industry."

The program for BCR's annual meeting has been developed to present information on the major portion of coal research under way in the United States. Research executives of private, industry-cooperative, and governmental coal-research activities will discuss programs they supervise. In addition BCR's three major programs—General Research, Locomotive Development and Mining Development—will be discussed by the research director of each program.

L. C. McCabe, chief of the USBM Fuels & Explosives Div., will describe the Bureau's coal research program. Dr. A. A. Potter, BCR president, will preside at the morning session, and R. E. Salvati, president of Island Creek Coal Co., and BCR vice president, will preside at the afternoon session.

The specific objective of this year's Techno-Sales Conference will be to learn from industry representatives how BCR can best help member companies.

To accomplish this the conference will emphasize needs of the salesmen in the morning session and needs of the engineers during the afternoon. Leading coal industry salesmen and engineers will tell, market by market, what they need from BCR to help them build sales in the face of oil and gas competition. Industry engineers active in BCR and BCR staff representatives will tell how much of these needs BCR has been able to fulfill and discuss prospects for future progress. W. W. Bayfield, executive vice president, American Coal Sales Association, will preside over the sales session, and Earl C. Payne, consulting engineer, Pittsburgh Consolidation Coal Co., and BCR committee chairman, will preside over the engineering session.

Ohio Plants Operating To Supply AEC Facility

Two major electric power plants, which will be the largest every built by private industry when completed, are now officially in operation. The Ohio Valley Electric Corp. announced at the end of January that its Clifty Creek plant at Madison, Ind., and Kyger Creek plant at Cheshire, Ohio, are delivering kilowatts

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to the U. S. Atomic Energy Commission's gigantic new uranium diffusion plant near Portsmouth, Ohio, via OVEC's new 33,000-v transmission system.

The first 200,000-kw turbo-generating unit at each of the two plants has been placed in service after several weeks of test, the Clifty Creek Unit 1 approximately on schedule and Unit 1 at Kyger Creek ahead of schedule by more than 1 mo. These two units will be followed by nine additional, similar machines, bringing OVEC's total generating capability to 2,200,000 kw.

Philip Sporn, president of OVEC, in commenting on the plants, said, "For size, scope and speed, this accomplishment has been without precedent. OVEC actually made the transition from drawing board to operation in a little more than 2 yr—a comparatively brief interim for any major power project."

OVEC was organized Oct. 1, 1952, by a group of 15 electric companies, all in the Ohio Valley region. The 25-yr contract signed with the AEC Oct. 15 called for OVEC to supply 1,800,000 kw of electricity a year. When completed, the two plants together will burn about 7,500,000 tons of coal a year, an average of about 20,500 tons per day or 854 tons an hour. All coal will be delivered to both plants via barge. Clifty coal will be supplied by: Ayrshire Collieries, Indianapolis; Sinclair Coal Co., Kansas City; and Green Coal Co., Owensboro, Ky.; Kyger coal by: North American Coal Co., Cleveland; and Pittsburgh Consolidation Coal Co., Pittsburgh.

Power Conference to View Wide Range of Topics

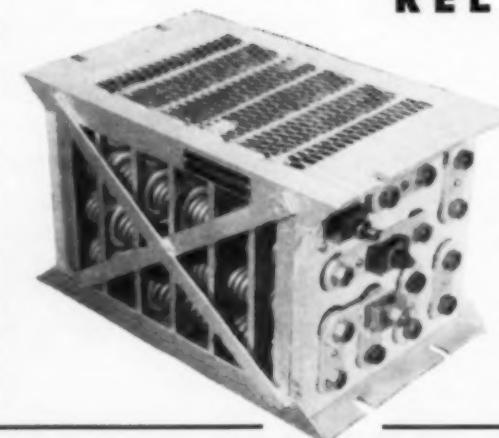
Utilization of new sources of energy will be among the principal topics discussed at the 17th annual American Power Conference March 30 through April 1 at the Sherman Hotel, Chicago. Special sessions are planned on the use of both nuclear and solar energy, according to the preliminary program released by Illinois Institute of Technology, which sponsors the conference in cooperation with 14 universities and nine societies.

A program of interest to those engaged in practically every phase of the power industry has been arranged. Included are several sessions devoted to central station and industrial power plants, steam and gas turbines, boilers, fuels, water technology, atomic energy and the generation, transmission, distribution and utilization of power. A cordial invitation to attend is extended to all.

Research on natural-gas substitutes, coal, and petroleum will be described at a special session on fuels March 31. The respective research areas will be discussed by Elmore S. Pettyjohn, director of the Institute of Gas Technology; H. J. Rose, vice president and director of research, Bituminous Coal Research, Inc.; and J. K. Roberts, general manager for research and development, Standard Oil Company of Indiana. Also at this session will be a discussion of the "Probable Trend in Coal Freight Rates," by Ford K. Edwards, director, Bureau of Coal Economics, NCA.

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Included in the new design is a sturdier frame, with the elimination of racks, pinions, and all mechanical power feed gearing. The four individually adjustable jacks make possible faster set-up and smoother drilling.

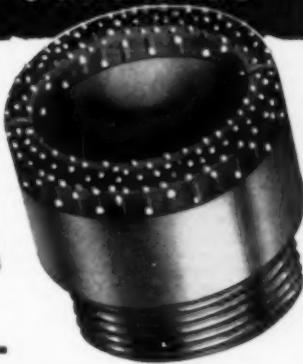


The H-81-53 drill is designed for drilling 5-6-8 inch holes to 100 feet or more. The greatly increased 81 h.p. engine in combination with the hydraulic feed makes possible the reduction of footage time by at least one half. All drive gears are totally enclosed. Power feed features direct hydraulic feed eliminating reduction gearing in hydraulic feed system.

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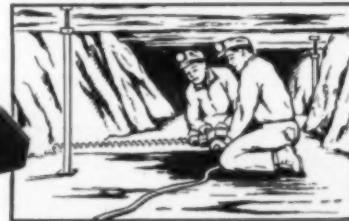
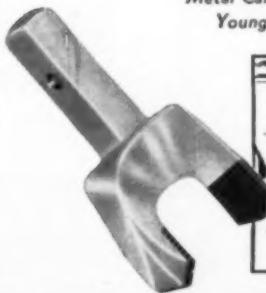
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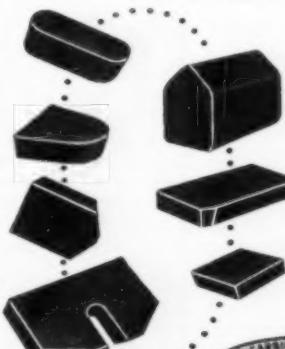
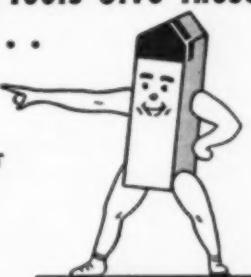
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2-6½ HP Sullivan tuggers, 250V. D.C. single drum
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- 1 Model 200W Bucyrus Monihan Walking Dragline.
- 2 Model 620W Page Walking Draglines.

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- 12—Jeffrey, 6 ton, type MH-88, 42", 44" and 48" Ga.
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- 10—G.E., 4 ton, type 801, 803, 821 Locomotives, 42", 44" and 48" Ga.
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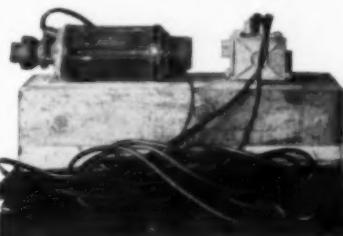
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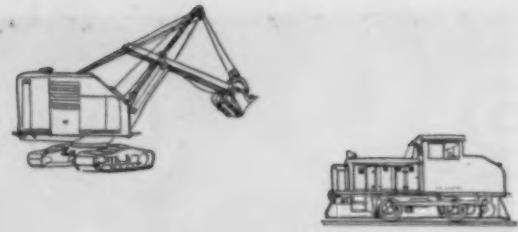
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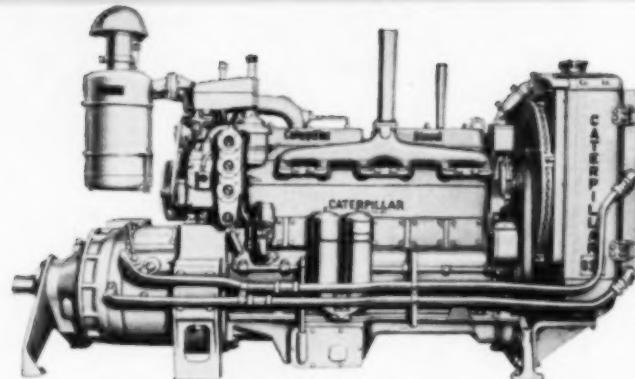
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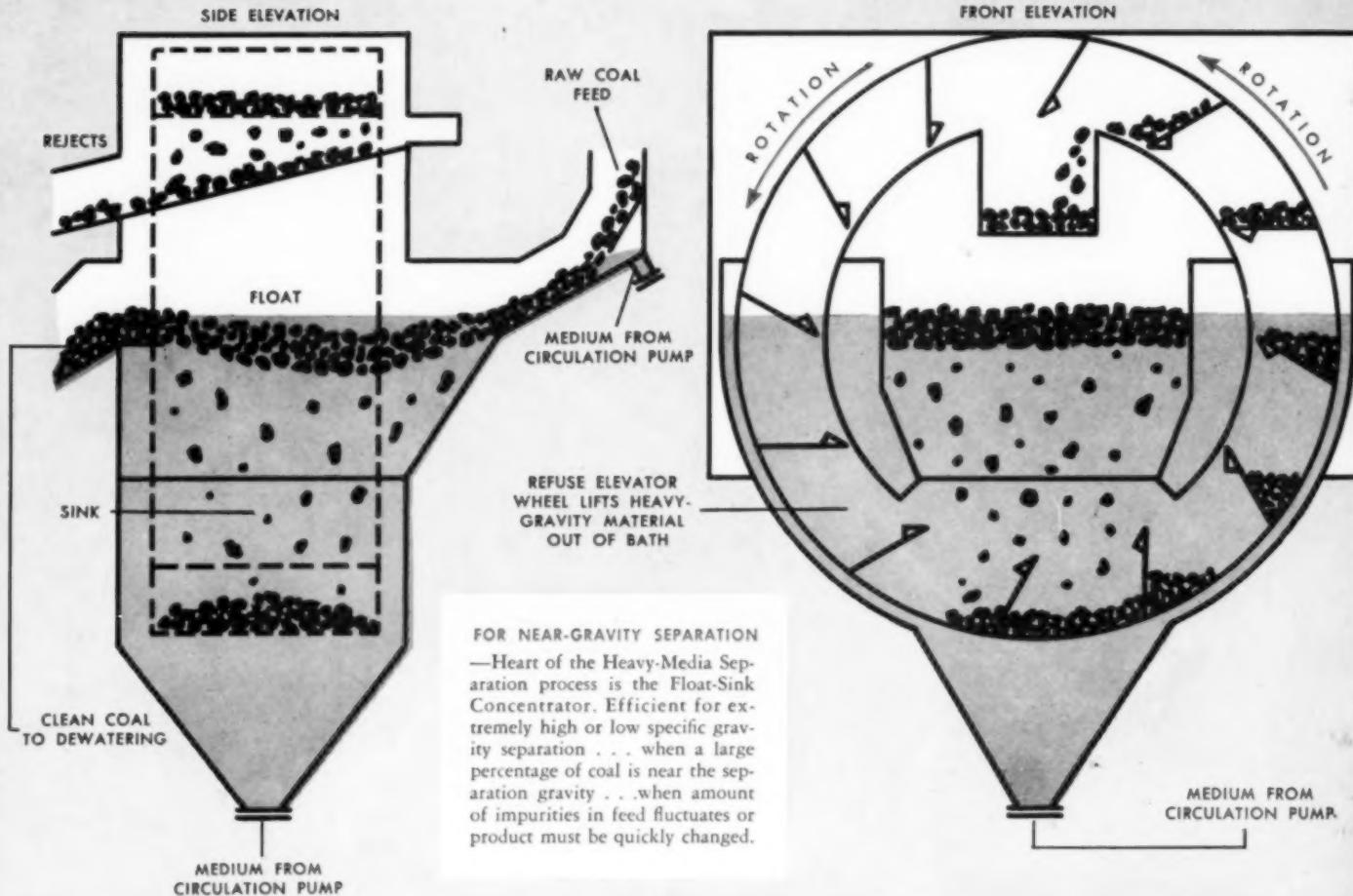
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